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Idaho Operations Office

Field Sampling Plan for the V-Tank Area New Sites, for Test Area North, Waste Area Group 1, Operable Unit 1-10

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Revision 0
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Approved by

Gary E. McDannel WAG 1 Project Engineer	8/9/04 Date
Allen E. Jantz WAG 1 Project Manager	8-9-04 Date

ABSTRACT

This field sampling plan describes the Waste Area Group 1, Operable Unit 1-10 field sampling activities to be performed at the Idaho National Engineering and Environmental Laboratory for the Test Support Facility 46, 47, and 48 sites. The sampling activities described in this plan support the remedial actions presented in the Operable Unit 1-10 Record of Decision and are in accordance with the *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory*.

This field sampling plan describes sampling activities to support site-specific characterization and remedial actions, including sample collection, quality assurance, quality control, and analytical procedures. Full implementation of the field sampling plan will help ensure that the final remediation goals established in the Record of Decision are met at the site, and that data are scientifically valid, defensible, and of known and acceptable quality.

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TABLES

ACRONYMS

AA	alternative action
AL	action level
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLP	contract laboratory program
COC	contaminant of concern
CPM	counts per minute
DD&D	deactivation, decontamination, and decommissioning
DOE	U.S. Department of Energy
DQA	data quality assessment
DQO	data quality objective
DS	decision statement
EPA	U.S. Environmental Protection Agency
FFA/CO	Federal Facility Agreement and Consent Order
FRG	final remediation goal
FSP	field sampling plan
FTL	field team leader
GCMS	gas chromatography/mass spectrometry
HAZWOPER	Hazardous Waste Operations
HWMA	Hazardous Waste Management Act
ICDF	INEEL CERCLA Disposal Facility
IET	Initial Engine Test
INEEL	Idaho National Engineering and Environmental Laboratory
LOFT	Loss-of-Fluid Test
LWTS	Liquid Waste Treatment System
MCP	management control procedure
OSHA	Occupational Safety and Health Administration
OU	Operable Unit

PCB	polychlorinated biphenyl
PM	project manager
PPE	personal protective equipment
PSQ	principal study question
QA	quality assurance
QAP	Quality Assurance Program
QAPjP	Quality Assurance Project Plan
QC	quality control
RadCon	radiological control
RD/RAWP	Remedial Design/Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
SAM	Sample and Analysis Management Office
SAP	Sampling and Analysis Plan
SC	sample custodian
SOW	Statement of Work
STD	standard
STL	sampling team leader
SVOC	semi-volatile organic compound
TAL	target analyte list
TAN	Test Area North
TCLP	toxicity characteristic leaching procedure
TSF	Technical Support Facility
UCL	upper confidence limit
USC	United States Code
VOC	volatile organic compound
WAC	waste acceptance criteria
WAG	waste area group
WGS	Waste Generator Services

Field Sampling Plan for the V-Tank Area New Sites, for Test Area North, Waste Area Group 1, Operable Unit 1-10

1. INTRODUCTION

This field sampling plan (FSP), when implemented with applicable sections of the current revision of the *Quality Assurance Project Plan for Waste Area Group 1,2,3,4,5,6,7,10, and Deactivation, Decontamination, and Decommissioning* (QAPjP) (DOE-ID 2004a), comprises the sampling and analysis plan (SAP) for the Idaho National Engineering and Environmental Laboratory (INEEL) Waste Area Group (WAG) 1, Test Area North (TAN), Operable Unit (OU) 1-10, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC 9601 et seq.) assessment and remedial actions for the V-Tank Area New Sites. The QAPjP describes quality assurance/quality control (QA/QC) protocols to achieve the specified data quality objectives (DQOs). The V-Tank Area New Sites include:

- Technical Support Facility (TSF)-46, TAN-616 Soil
- TSF-47, TAN-615 Sewer Line Soil
- TSF-48, TAN-615 Sump Soil.

This FSP, prepared in accordance with the *Federal Facility Agreement and Consent Order* (FFA/CO) (DOE-ID 1991), outlines the sampling requirements, QA/QC, and analytical procedures for TSF-46, TSF-47 and TSF-48, collectively called “V-Tank Area New Sites.” Use of this FSP will help ensure that data are scientifically valid, defensible, and of known and acceptable quality, while use of the QAPjP will ensure that the data generated are suitable for their intended purposes. Results from sampling activities will be used to define the area of contamination (nature and extent) and to confirm that remedial action goals either have or have not been met.

This FSP is identified as a secondary document under the FFA/CO, fulfills the specified FFA/CO requirements, and supports the *Group 2 Remedial Design/Remedial Action Work Plan (RD/RAWP) Addendum for the Assessment and Cleanup of the V-Tank Area New Sites* (DOE-ID 2004b). The QAPjP and this FSP have been prepared pursuant to the U.S. Environmental Protection Agency (EPA) *National Oil and Hazardous Substances Contingency Plan* (EPA 1990), the *Guidance for Conducting Remedial Investigations and Feasibility Studies under the Comprehensive Environmental Response, Compensation, and Liability Act* (EPA 1988), the FFA/CO, and “Environmental Sampling Activities at the INEEL” (MCP-9439).

1.1 Field Sampling Plan Objectives

The object of this FSP is to provide information regarding soil contamination at the TSF-46, TSF-47, and TSF-48 sites. Results from screening and sampling activities outlined in this FSP will be used to further characterize these sites to bound the area of contamination, identify potentially new final remediation goals (FRGs), confirm that remedial action objectives have been achieved, and characterize excavated soil for disposal at the INEEL CERCLA Disposal Facility (ICDF).

The Record of Decision (ROD) for OU 1-10 (DOE-ID 1999) identified cesium-137 (Cs-137) as the only contaminant of concern (COC) requiring remediation in the V-tanks soil, and established an FRG of 23.3 pCi/g for Cs-137 to depths down to 10 ft below grade surface (bgs). The 2004 amendment to the

TAN OU 1-10 ROD (DOE-ID 2004c) further clarified management of contaminated soil from the V-Tanks and associated components, including:

- All contaminated soil (soil contaminated with Cs-137 at or above the OU 1-10 FRG of 23.3 pCi/g) at 10 ft bgs and less will be excavated and disposed at an approved soil repository.
- Postremediation soil sampling will be performed on areas of contaminated soil at depths of 10 ft bgs and less to verify FRGs are met.
- For soil contaminated at depths greater than 10 ft bgs, postremediation sampling will be performed to determine the need for institutional controls.
- For contaminated soil beneath piping and structures where there is evidence of a release, postremediation soil sampling at the bottom of the excavation will be performed to analyze for V-Tank contaminants to support a risk analysis that supports a potential revision to the FRGs and a determination of the need for further actions. Further actions could consist of institutional controls, further remediation, or no action.
- For contaminated soil beneath piping and structures where there is no evidence of a release, perform postremediation soil sampling to determine appropriate institutional controls, if any.

The declaration section of the OU 1-10 ROD addresses the potential for identifying new contaminated environmental media, references the FFA/CO process for new site inclusion, and where appropriate, allows for an expedited process of assessment and remediation for these new sites using remedial action objectives and final remediation goals from the ROD. The process is possible where the contamination at a new area is similar to the contamination found in and around the V-Tanks (or PM-2A Tanks) such that the remedy for radiologically contaminated soil in the OU 1-10 ROD can be applied to the new area. This expedited process is being implemented for the V-Tank Area New Sites through the *Group 2 Remedial Design/Remedial Action Work Plan (RD/RAWP) Addendum for the Assessment and Cleanup of the V-Tank Area New Sites* (DOE-ID 2004b).

Cs-137 is being used in this FSP as the indicator parameter to identify soil that requires excavation and disposal. If evidence of a release is found, postremediation soil sampling at the bottom of the excavation will be performed to analyze for V-Tank contaminants to support a risk analysis that supports a potential revision to the FRGs. The need for further action or achievement of the remediation standard for COCs other than Cs-137 at the V-Tank Area New Sites will be determined using the risk-based screening approach described in *Risk-Based Screening Approach for Waste Area Group 1 Soils* (INEEL 2004a). By sampling each area and comparing contaminant concentrations against the contaminant levels in the risk assessment plan, INEEL can quickly determine whether soils require removal, the site requires institutional controls, or no action is required. Communication with State and Federal agencies will include a brief risk-based assessment report that documents the results of this process and includes the proposed actions.

1.2 INEEL CERCLA Disposal Facility Requirements

This FSP is designed to assist in ensuring that the soil wastes generated during implementation of any V-Tank Area New Sites remedial actions will meet associated waste characterization requirements for waste disposal at the ICDF, or other approved facility. The ICDF Complex is designed to provide centralized receiving, inspection, and treatment and segregation areas necessary to stage and store incoming waste from various INEEL CERCLA remediation sites prior to disposal at the ICDF Landfill or evaporation ponds, or shipment off-Site. Only on INEEL CERCLA wastes meeting the appropriate *ICDF Complex Waste Acceptance Criteria* (WAC) (DOE-ID 2003a) will be accepted at ICDF.

The soils excavated during the V-Tank Area New Sites project that are intended for disposal will be held in a staging area at or near the excavation site prior to profiling and dispositioning to the ICDF. It is expected that the COCs in the soil generated from activities covered under this FSP will be within the bounds of the material profile that has already been developed for V-Tank area soils per the *ICDF Complex Material Profile Guidance* (DOE-ID 2003b).

Verification sampling of the soil will be performed by ICDF personnel under a separate verification sampling and analysis plan, as specified in the *ICDF Complex Waste Verification Sampling and Analysis Plan* (DOE-ID 2003c). Verification sampling and analysis is done to confirm that key parameters (identified in the verification SAP) in the waste do not exceed the limits on the material profile. Key parameters are those identified as impacting ICDF operations or limiting acceptance of waste in the landfill, as defined by the ICDF WAC and/or operational limits. Regulatory limits on radionuclide activity that can be disposed in the ICDF Landfill are invoked by the OU 1-10 ROD and DOE Order 435.1, as discussed in the *Waste Acceptance Criteria for the ICDF Landfill* (DOE-ID 2004d). Waste verification can include visual inspection of the waste, administrative controls, documentation and calculation reviews, or verification sample collection. If possible, ICDF waste verification activities may be coordinated with the sampling effort described in this FSP.

2. WORK SITE DESCRIPTION AND BACKGROUND

2.1 Historical Background

Located in the north-central portion of the INEEL Site, as shown in Figures 1 and 2, TAN was constructed between 1954 and 1961 to support the Aircraft Nuclear Propulsion Program, which developed and tested designs for nuclear-powered aircraft engines until the research was terminated by Congress in 1961. The area's facilities were then converted to support a variety of other DOE research projects. From 1962 through 1986, the area was principally devoted to the Loss-of-Fluid Test (LOFT) Facility, which was used to perform reactor safety testing and studies. Beginning in 1980, the area was used to conduct research and development with material from the 1979 Three-Mile Island reactor accident (DOE-ID 1997).

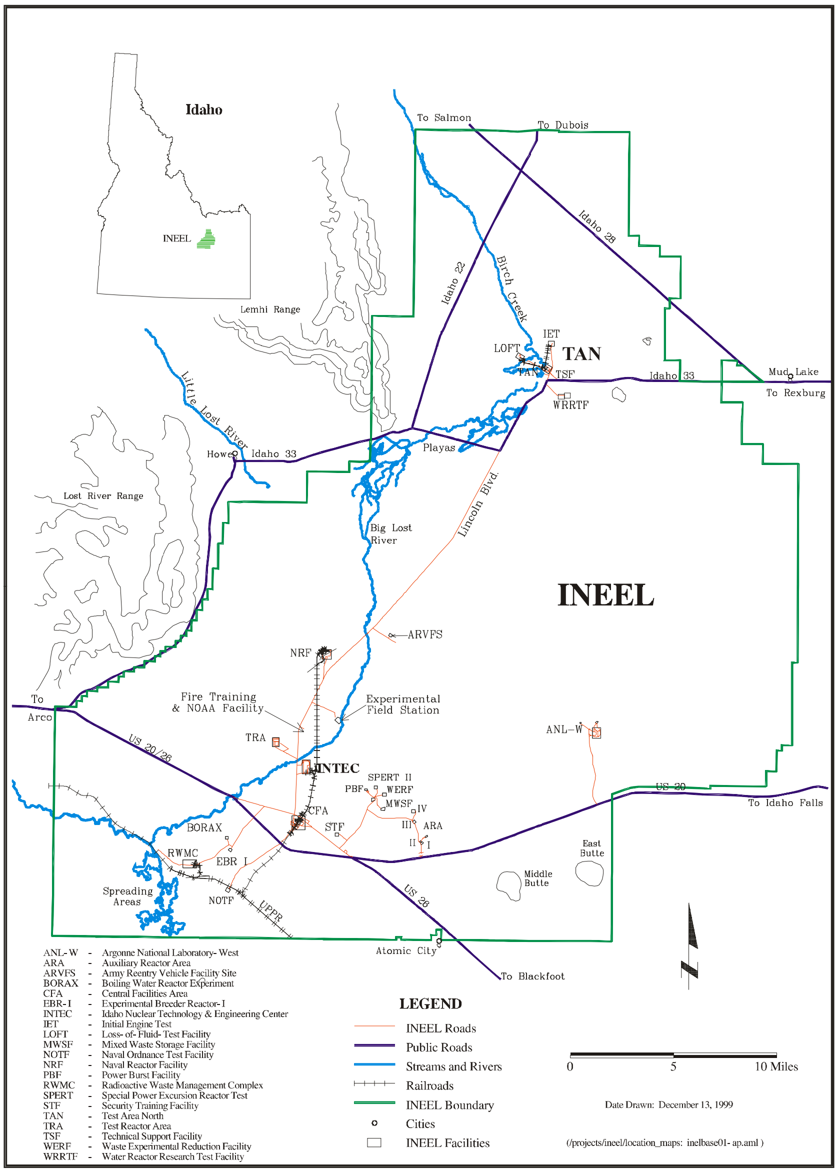


Figure 1. Map showing the location of Test Area North at the Idaho National Engineering and Environmental Laboratory Site.

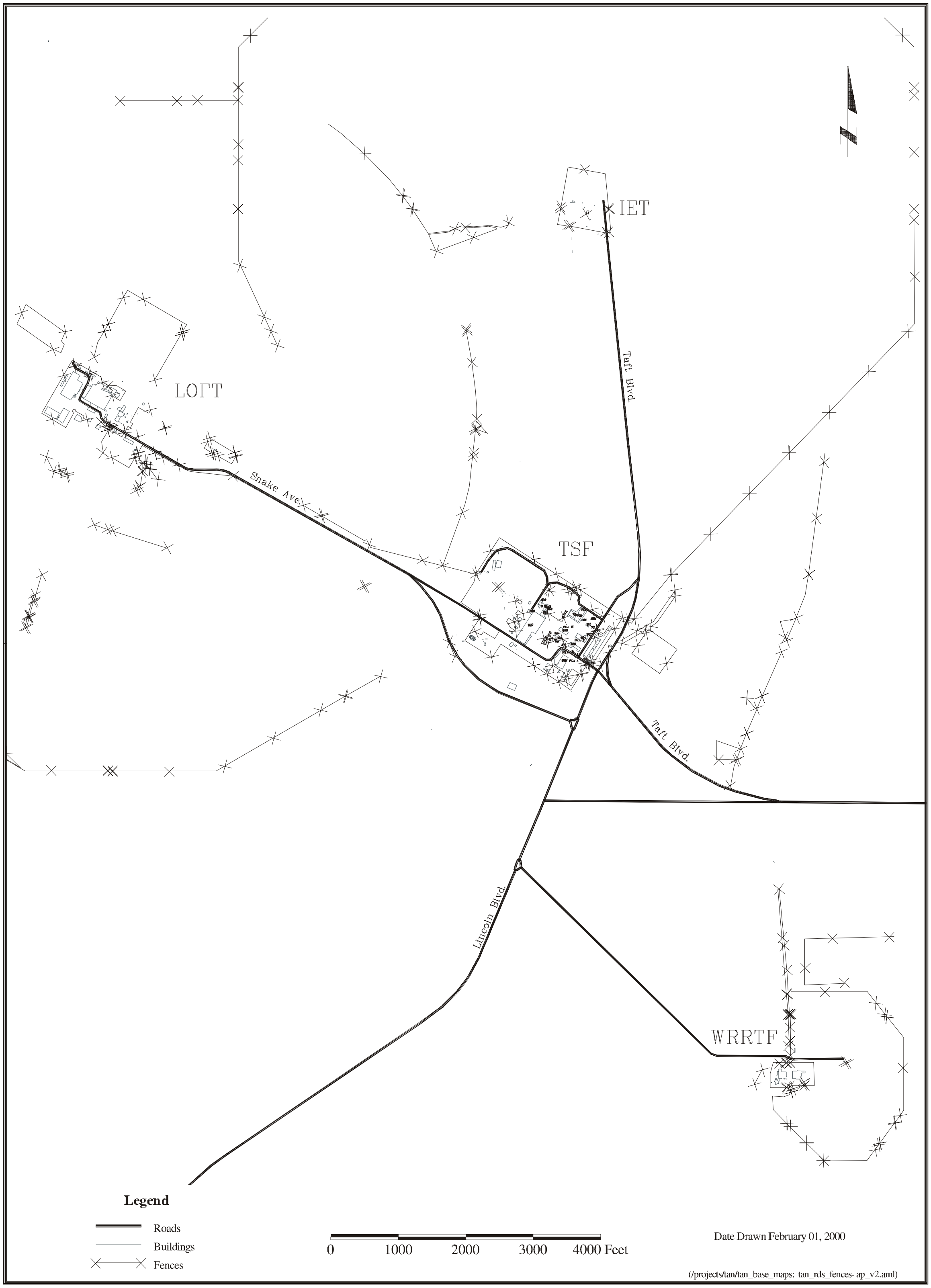


Figure 2. Map showing the Test Area North facilities.

During the mid-1980s, the TAN Hot Shop (DOE-ID 1999) supported the final tests for the LOFT program. Current activities include the manufacture of armor for military vehicles at the Specific Manufacturing Capability Facility and nuclear inspection and storage operations at TSF. The Initial Engine Test (IET) Facility has been deactivated, decontaminated, and decommissioned by the INEEL Deactivation, Decontamination, and Decommissioning (DD&D) program.

In 1991, the FFA/CO established 10 operable units (OUs) within WAG 1, consisting of 94 potential release sites (DOE-ID 1997). The sites include various types of pits, numerous spills, ponds, aboveground and underground storage tanks (USTs), and a railroad turntable. A comprehensive remedial investigation/feasibility study (RI/FS) was initiated in 1995 to determine the nature and extent of the contamination at TAN. The FFA/CO defines OU 1-10 as the comprehensive WAG 1 RI/FS (DOE-ID 1997), which culminated with the OU 1-10 ROD. Final remediation goals were established in the ROD based on long-term risks associated with Cs-137 activity.

2.2 Work Site Description

The V-Tank Area New Sites consist of three newly identified areas requiring evaluation under CERCLA. The TSF-46 (TAN-616 Soils) site consists of soil within and around the footprint of TAN-616, the Liquid Waste Treatment Facility. The TAN-616 Liquid Waste Treatment System (LWTS) was designed to collect, store, and concentrate radionuclide contaminated liquid waste from TAN facilities. The tanks and piping associated with both the V-Tanks and PM-2A Tank sites are part of the LWTS. TSF-47 (TAN-615 Sewer Line Soils) is a site of an apparent past rupture of a sewer/industrial line located underneath and to the west of TAN-615, the Assembly and Maintenance Building (now removed). The TSF-48 (TAN-615 Sump Soils) site consists of the soil beneath two sumps, now removed, that were located in the south end of TAN-615, approximately 6 ft from the TAN-616 foundation wall.

Because of their close proximity (see Figure 3), these new sites potentially contain contaminants that have leaked from the TAN-616 LWTS or indirectly through LWTS building foundations. Therefore, the analyses that will be conducted on samples collected under this FSP will be based on COCs found in the V-Tanks and surrounding soils.

2.2.1 TSF-46, TAN-616 Soils

The TSF-46 site consists of soil within and around the footprint of TAN-616. The TAN-616 facility is a concrete structure located northeast of TAN-607. The building is within 2.4 m (8 ft) of the V-tanks (V-1, V-2, and V-3) on the east, and 18.2 m (60 ft) of TAN-607 on the south. The outside dimensions of the facility are 10.9 × 14 m (36 × 46 ft) and the building is approximately 7 m (23 ft) tall.

TAN-616 was constructed in 1955 and contained an evaporator system, which was designed to collect, store, and concentrate radionuclide-contaminated liquid waste, mostly from the decontamination of equipment and facilities. The evaporator system operated from 1958 until the early 1970s; TAN-616 was taken out of service in 1972 due to evaporator vessel integrity problems, and a temporary evaporator system installed above the holding tanks (PM-2A tanks, V-13 and V-14). From 1972 until 1975, wastewater may have been transferred via TAN-616 from the collecting tanks (V-1, V-2, and V-3) directly to the holding tanks, which at this time served as feed tanks to this temporary evaporator system. (INEEL 2001).

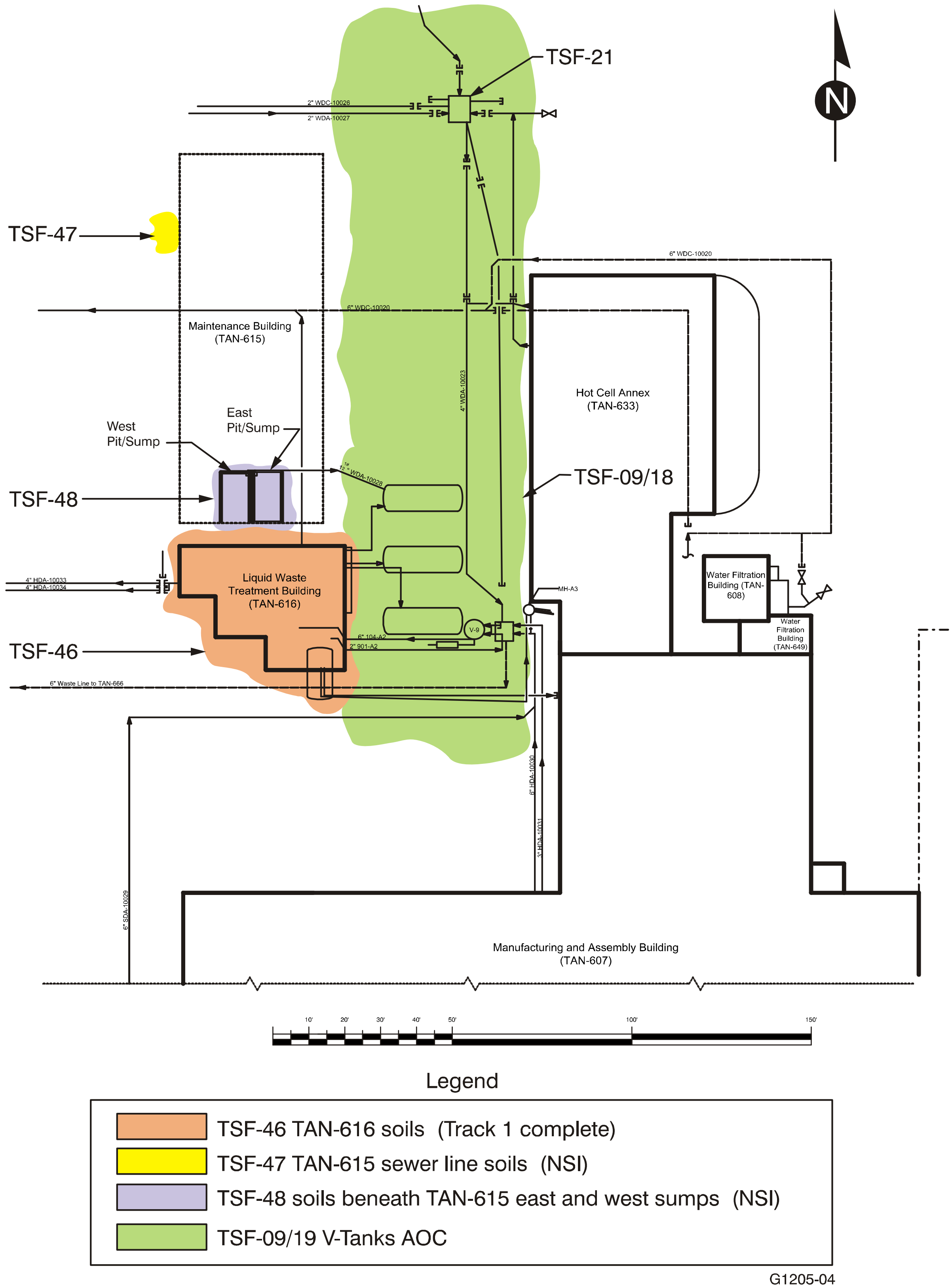


Figure 3. Map showing proximity of TSF-46, TSF-47, and TSF-48 to TAN V-Tanks.

TAN-616 and the LWTS is currently undergoing closure under the Hazardous Waste Management Act (HWMA 1983) and the Resource Conservation and Recovery Act (RCRA) (42 USC 6901 et. seq.) and subsequent decontamination, decommissioning, and dismantlement. Soils underneath and around the facility will be excavated to support the demolition and removal of TAN-616, and is discussed further in the Notice of CERCLA Disturbance: “Excavation of Soils Surrounding TAN-616” (NCD-T04-03, Revision 2). Debris, including concrete rubble, paint chips, that becomes commingled with CERCLA soils will be managed along with the CERCLA soils. Sampling under this FSP will be done in conjunctions with closure and DD&D activities.

2.2.2 TSF-47, TAN-615 Sewer Line Soils

TSF-47 is a site of an apparent past sewer/industrial line leak that was discovered by DD&D crews in 2002 while excavating the TAN-615 building piers during dismantlement of the facility. The soils in the vicinity of the piping were damp and the sewer line was still active. A radiological survey performed on this soil identified contamination of 30,000 dpm.

The contaminated soil was 10–11 ft bgs and approximately 5 ft outside the west wall of TAN-615, and just above where an east-west 6-in. cast-iron sanitary sewer line tied into a concrete line. Based on INEEL Drawing No. 423666, the 6-in. sanitary sewer line upstream of the location of the contaminated soil has several sewer and industrial discharge feeder connections from several TAN buildings, including TAN-607, TAN-608, TAN-633, and TAN-615. Further excavation revealed that approximately 8 ft west from the tie-in point for the TAN-615 highbay drains, a crude concrete and plastic bag patch had been applied to the 6-in. drain line. At the time of discovery, the damaged section of pipe, as well as the section of pipe that contained the old tie-in from the highbay drains, was replaced with new pipe and the area backfilled with clean soil. (INEEL 2003).

2.2.3 TSF-48, TAN-615 East and West Pits/Sumps Area Soils

The TSF-48 site consists of the soil beneath and around two pits/sumps, now removed, that were located in the south end of TAN-615 approximately 6 ft away from the TAN-616 building’s foundation walls. The TAN-615 building was originally constructed in 1955 to assemble and test nuclear reactors for the Aircraft Nuclear Propulsion Program, although the building was never used for this purpose.

The east pit/sump was located in the test area and was referred to as the test pit/sump. The pit was 8 × 14 × 8 ft deep with the sump located in the northwest corner. The sump’s dimensions were 12 × 12 in. with a depth of 3.8 ft. The test area originally was used for the testing of fuel assemblies. The east pit/sump and ancillary piping were reported to be out of service for their original use prior to 1971. Between 1971 and 1978, there was no known use of the pit/sump, and TAN operations were in a shutdown mode during most of that time. Around 1978, the east pit/sump was decontaminated and then converted to use as part of the LOFT control rod drive mechanism testing. From 1978 to about 1985, testing included filling and evacuating the pit/sump with demineralized water. The pit/sump and ancillary piping were out of service by 1985 when assembly of LOFT fuel ceased.

The west pit/sump was located in the decontamination area and was referred to as the decontamination pit. The pit was 8 × 14 × 8 ft deep with the sump located in the northeast corner. The sumps dimensions were 12 × 12 in. with a depth of 9 in. The west pit/sump and ancillary piping were reported to be out of service for its original use prior to 1971. The decontamination tanks, pump, a fume hood, and exhaust stack were removed before the early 1970s when the mission of the Actuator Facility was changed to support the LOFT Program. Between 1971 and 1976, there was no known use of the west pit/sump.

The TAN-615 building, including the east and west pits/sumps, was decontaminated and dismantled in 2002. The pits/sumps were excavated to a depth of 11–12 ft and then backfilled to approximately 4 ft bgs. The project completion is described in *Final Report for the Decontamination and Decommissioning of the Test Area North-615* (INEEL 2003).

2.3 Previous Investigations

2.3.1 TSF-46, TAN-616 Soils

Considerable characterization has been performed on the soils surrounding TAN-616 over the years. In 1983, the surface around TAN-616 (excluding the far west and south side) was gridded and surface radiation readings were collected. The highest activities measured occurred on the east side of TAN-616, which has been investigated further under CERCLA site TSF-09/18. Radiological activity was also evident on the north and west (near the vestibule and control room) sides of TAN-616, but at significantly lower levels than the east side soils.

Releases to the soils near the southeast corner of TAN-616 were from spillage during waste transfer activities, but no data exist to characterize the nature and extent of contamination in this area. Soil in this area could also possibly be impacted other sources (i.e., spills or windblown contamination).

Since the prevailing wind direction at TAN is from the southwest, soils to the west may have been contaminated by particulate deposition from the ventilation exhaust or by windblown contamination from other radiologically contaminated sites encompassing the area to the west of TAN-616, such as TSF-06.

Soils to the north of the facility were included in the radiologically controlled area encompassing TSF-09/18 spill area and for this reason may be similarly contaminated. The soils north of TAN-616 (between TAN-615 and TAN-616) in the area of the TAN-616 evaporator pit entrance ramp were sampled in August of 2002 by DD&D in support of the WAG 1 CERCLA program (INEEL 2002). The ramp is located approximately 8 ft from the TAN-616 northwest wall on the north side and is about 15 ft wide. Sampling took place during excavation between the buildings as TAN-615 was being dismantled. At the time of sampling, the depth of the excavation was about 4 ft bgs.

Sample ID TAN44601 was collected 4 ft bgs by coring 1 ft into the dig face. The sample was composited from four locations at this depth. Sample TAN44701 and a duplicate TAN44702 were collected from 3 ft below ground surface using the same methodology as used for TAN44601. Sample TAN44801 was collected from multiple locations at the ground surface between TAN-615 and TAN-616. Sample TAN44901 was collected from several locations from a bag of soil that had already been excavated. All samples were analyzed for radiological constituents (Gamma Spec/Gross Alpha-Beta, and Sr-90), polychlorinated biphenyls (PCBs), gas chromatography/mass spectrometry (GCMS) semivolatiles, GCMS volatiles, toxicity characteristic leaching procedure (TCLP) metals, TCLP semivolatiles, TCLP volatiles, and total metals (INEEL 2002). Table 1 shows the analytical results for those constituents that were present in concentrations above the detection limits.

Table 1. Analytical results from 2002 sampling of TSF-46.

Analysis	Constituent	TAN44601 (4-ft below surface)	TAN44701 (3-ft below surface)	TAN44702 (3-ft below surface)	TAN44801	TAN44901
Organics (ug/kg)						
	Acetone	ND	7.2	ND	ND	ND
PCB (ug/kg)						
	Arochlor 1260	ND	ND	87	73	ND
Radiological (pCi/g)						
	Co-60	ND	ND	ND	6.51E-02	ND
	Cs-137	1.92E-01	1.79E+01	3.55E+01	1.14E+01	1.06E+00
	K-40	1.88E+01	1.56E+01	1.55E+01	1.12E+01	1.62E+01
	Ra-226	1.14E+00	9.97E-01	9.16E-01	6.98E-01	9.48E-01
	Sr-90	ND	2.19E+00	2.40E+00	2.40E+00	ND
	Zn-65	ND	1.24E-01	ND	ND	ND
	Gross Alpha	1.60E+01	1.50E+01	1.66E+01	1.18E+01	1.61E+01
	Gross Beta	2.13E+01	5.15E+01	4.17E+01	3.34E+01	2.97E+01
Metals (mg/kg)						
	Aluminum	13,500.00	12,400.00	NA	5,590.00	10,700.00
	Antimony	1.10	0.87	NA	0.80	0.91
	Arsenic	19.00	13.80	NA	8.50	12.60
	Barium	305.00	192.00	NA	102.00	179.00
	Beryllium	0.96	0.81	NA	0.44	0.79
	Cadmium	0.87	1.10	NA	0.99	0.86
	Calcium	60,700.00	84,300.00	NA	101,000.00	88,900.00
	Chromium	30.20	27.00	NA	15.50	23.80
	Cobalt	8.70	7.20	NA	4.20	7.10
	Copper	26.50	23.00	NA	15.60	20.30
	Iron	20,600.00	17,200.00	NA	9,950.00	16,500.00
	Lead	21.30	18.10	NA	17.30	15.90
	Magnesium	11,400.00	11,600.00	NA	7,650.00	11,300.00
	Manganese	420.00	364.00	NA	219.00	337.00
	Mercury	0.05	0.07	NA	0.28	0.04
	Nickel	35.20	30.90	NA	18.50	30.40
	Potassium	2,300.00	2,300.00	NA	1,200.00	1,920.00
	Selenium	1.80	1.00	NA	0.33	0.61
	Silver	0.16	0.15	NA	0.14	0.15
	Sodium	456.00	425.00	NA	297.00	423.00
	Thallium	1.60	1.50	NA	2.10	2.00
	Vanadium	42.70	37.30	NA	20.50	31.90
	Zinc	109.00	105.00	NA	130.00	105.00

2.3.2 TSF-47, TAN-615 Sewer Line Soils

Samples of soil surrounding the leaking sanitary waste line were collected in July 2002. One sample and one duplicate (TAN44301 and TAN44302) were collected from a box containing soil that had already been excavated. The other two samples were collected from two locations beneath the sanitary line (labeled “east” and “west”) where green poly was wrapped around the piping. The “east” location is sample ID TAN44401 and the “west” sample ID TAN44501. All samples were composite samples, and analyzed for radiological constituents (Gamma Spec/Gross Alpha-Beta, and Sr-90), PCBs, GCMS semivolatiles, GCMS volatiles, and total metals. Table 2 shows the analytical results for those constituents that were present in concentrations above the detection limits. All organics were below detection limits.

Table 2. Analytical results from 2002 sampling of TSF-47.

Analysis	Constituent	TAN44301	TAN44302	TAN44401	TAN44501
PCB (ug/kg)					
	Aroclor 1262	ND	ND	65	ND
Radiological (pCi/g)					
	Co-60	9.64E-02	8.60E-02	6.95E+01	5.52E-01
	Cs-137	1.62E+01	1.64E+01	2.64E+03	5.10E+02
	K-40	8.63E+00	1.10E+01	1.54E+01	1.91E+01
	Ra-226	7.12E-01	8.81E-01	1.64E+00	1.07E+00
	Sr-90	4.75E+00	5.71E+00	2.20E+02	3.07E+01
	Gross Alpha	1.46E+01	2.09E+01	5.49E+01	2.66E+01
	Gross Beta	4.02E+01	6.28E+01	2.30E+03	2.10E+02
Metals (mg/kg)					
	Aluminum	6,910	6,180	10,300	12,100
	Antimony	1.4	1.3	1.9	1.9
	Arsenic	10.7	9.4	13.0	14.4
	Barium	135	134	180	199
	Beryllium	0.38	0.37	0.50	0.46
	Cadmium	0.82	0.85	0.82	0.73
	Calcium	102,000	104,000	79,300	70,500
	Chromium	16.9	14.7	27.2	27.4
	Cobalt	5.7	5.4	8.1	8.6
	Copper	18.1	16.5	34.4	27.8
	Iron	12,500	10,700	18,100	19,500
	Lead	13.7	12.7	25.9	19.5
	Magnesium	10,100	9,200	11,100	11,600
	Manganese	298	308	392	383
	Mercury	0.02	0.03	0.32	0.06
	Nickel	24.3	22.3	31.3	32.3
	Potassium	1,370	1,250	1,940	2,200
	Selenium	0.24	0.23	0.26	0.59
	Silver	0.10	0.09	0.21	0.10

Table 2. (continued).

Analysis	Constituent	TAN44301	TAN44302	TAN44401	TAN44501
	Sodium	500	461	528	596
	Thallium	0.53	0.50	0.57	0.55
	Vanadium	24.5	20.3	34.9	39.8
	Zinc	76.6	67.5	236	100

2.3.3 TSF-48, TAN-615 East & West Pits/Sumps Area Soils

2.3.3.1 East Pit/Sump. The east pit/sump was evaluated under the Voluntary Consent Order (VCO) Program in 2001–2002 and determined never to have managed RCRA hazardous waste. At that time, the pit/sump contained only a small amount of dry residual material (dirt, sediment and fiberglass debris) in the bottom sump section. Sediment samples from the pit/sump were collected and analyzed for radionuclides, semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), PCBs, and metals. The analytical results determined that the solid residue was radiologically contaminated, primarily from the presence of Cs-137, Sr-90, and Co-60 (U-235 also was detected) and also was characteristically hazardous due to concentrations of lead (5.49 mg/L) and cadmium (2.14 mg/L) above the TCLP regulatory levels.

The residuals from the TAN-615 east pit/sump were removed and disposed as mixed low-level waste (MLLW). The pit/sump was decontaminated (scabbled) of visible staining (to remove residual RCRA characteristically hazardous sediment) in 2002 during DD&D of TAN-615. The concrete was re-sampled, and the contaminants of concern (lead and cadmium) were below regulatory levels. The remaining concrete was verified to be low level waste (LLW) only. The east pit/sump was removed, the area backfilled with clean fill, and the concrete later transported to RWMC for disposal as low-level radioactive waste (INEEL 2003).

Samples of the soil from beneath the TAN-615 east pit/sump were collected in July of 2002. Sample TAN43401 was collected under the sump at an estimated depth of 12 in. below the sump floor (or approximately 13.25 ft below surface grade). Sample ID TAN43501 was a composite sample collected from three different locations at an estimated depth of 12 in. beneath the pit floor (or approximately 9.5 ft below surface grade). Both samples were analyzed for radiological constituents (Gamma Spec/Gross Alpha-Beta, and Sr-90), and total metals. Table 3 shows the analytical results for those constituents that were present in concentrations above the detection limits for the soil samples collected in 2002 from the east pit/sump.

Table 3. Analytical results from 2002 sampling of TSF-48 East pit/sump.

Analysis	Constituent	TAN43401 (under sump)	TAN43501 (under floor slab)
Radiological (pCi/g)			
	Cs-137	ND	ND
	K-40	1.73E+01	1.77E+01
	Ra-226	1.00E+00	1.07E+00
	Gross Alpha	3.02E+01	2.41E+01
	Gross Beta	3.77E+01	3.33E+01

Table 3. (continued).

Analysis	Constituent	TAN43401 (under sump)	TAN43501 (under floor slab)
Metals (mg/kg)			
	Aluminum	10,400	9,440
	Antimony	1.6	1.4
	Arsenic	13.3	13.5
	Barium	201	192
	Beryllium	0.45	0.46
	Cadmium	0.81	0.70
	Calcium	97,300	87,400
	Chromium	22.2	21.3
	Cobalt	7.9	7.4
	Copper	29.2	25.4
	Iron	16,900	15,800
	Lead	19.1	17.1
	Magnesium	12,300	9,920
	Manganese	391	350
	Mercury	0.05	0.05
	Nickel	29.9	28.3
	Potassium	2,100	1,890
	Selenium	0.24	0.25
	Silver	0.10	0.10
	Sodium	566	584
	Thallium	0.52	0.55
	Vanadium	33.1	31.1
	Zinc	104	92.1

2.3.3.2 West Pit/Sump. The west pit/sump was evaluated under the VCO (Inventory No. 98TAN00320) in 2001–2002 and determined never to have managed RCRA hazardous waste The west pit/sump, which had been filled with gravel and capped with an 8-in. concrete slab sometime in the past, were sampled with a drill rig at three different location within the pit, including the gravel at the base of the sump. It was expected that, if any waste was present in the sump when it was originally filled with gravel, it would be located at the lowest sampling depths. Samples of the gravel and concrete were analyzed for radionuclides, total and TCLP metals, and TCLP SVOCs. The results showed the presence of low levels of radionuclide contamination (primarily from the presence of Cs-137 and Sr-90, but other gamma-emitting radionuclides such as Co-60, Ra-226, and U-235 also were detected). No RCRA TCLP contaminants exceeded regulatory limits (EDF-2167).

The pit, including the slab, gravel, and sump were removed in 2002 during DD&D of TAN-615 and transported to RWMC for disposal as low-level radioactive waste. At this time, a sample (Sample ID TAN436) of the soil beneath the pit floor was collected and analyzed for radiological constituents (Gamma Spec/Gross Alpha-Beta, and Sr-90), and total metals. (INEEL 2002) Table 4 shows the analytical results for those constituents that were present in concentrations above the detection limits for the soil sample collected in 2002.

Table 4. Analytical results from 2002 sampling of TSF-48 West pit/sump.

Analysis	Constituent	TAN43601 (under floor slab)
Radiological (pCi/g)		
	Cs-137	2.38E-01
	Ra-226	1.29E+00
	Sr-90	4.68E-01
	U-235	8.24E-01
	Gross Alpha	3.43E+01
	Gross Beta	2.98E+01
Metals (mg/kg)		
	Aluminum	13400
	Antimony	1.6
	Arsenic	14.8
	Barium	230
	Beryllium	0.62
	Cadmium	0.93
	Calcium	62600
	Chromium	28.8
	Cobalt	9.0
	Copper	27.9
	Iron	19700
	Lead	23.3
	Magnesium	12200
	Manganese	418
	Mercury	0.05
	Nickel	32.7
	Potassium	2600
	Selenium	0.25
	Silver	0.10
	Sodium	516
	Thallium	0.99
	Vanadium	42.5
	Zinc	106

3. PROJECT ORGANIZATION AND RESPONSIBILITIES

A clearly defined project organization is essential to ensure that the project remediation objectives are achieved and that data collection, reporting, evaluation, and interpretation requirements are met. The following sections outline the specific responsibilities of key site personnel.

3.1 Key Personnel Responsibilities

Responsibilities for key personnel associated with the field activities described in this FSP are outlined in the following sections.

3.1.1 Project Manager

The WAG 1 project manager (PM) will ensure that all activities conducted during the project comply with INEEL management control procedures (MCPs), program requirements documents (PRDs), and all applicable Occupational Safety and Health Administration (OSHA), EPA, DOE, U.S. Department of Transportation, and State of Idaho requirements. The PM coordinates all document preparation and all field, laboratory, data evaluation, risk assessment, dose assessment, and closure design activities. The WAG 1 PM is responsible for the overall work scope, schedule, and budget.

3.1.2 Field Team Leader/Engineer

The field team leader (FTL) will be delegated responsibility for the safe and successful completion of the sampling activities outlined in this FSP. The FTL works with the environment, safety, health, and quality (ESH&Q) oversight personnel and the field team to manage field sampling related operations and to execute this FSP. The FTL will contact ESH&Q personnel on the day before the commencement of work to facilitate scheduling of oversight. The FTL enforces site control, documents activities, conducts the daily pre-job briefings at the start of each shift. Health and safety issues may be brought to the attention of the FTL by any team member.

The FTL serves as the representative for environmental restoration activities at the site. The FTL is responsible for field activities, crafts personnel, and other personnel assigned to work at the site. The FTL will serve as the interface between facility operations and project personnel and will work closely with the sampling team at the site to ensure that the objectives of the project are accomplished in a safe and efficient manner. The FTL will evaluate and apply Human Performance techniques to ensure that the appropriate defenses are in place (prior to the commencement of work) to ensure that identified error precursors are eliminated or mitigated. The Human Performance techniques shall also be applied when the scope of work or conditions change. The FTL will work with all other identified project personnel to accomplish day-to-day operations at the site, identify and obtain additional resources needed at the site, interact with the ESH&Q oversight personnel on matters regarding health and safety, and ensure that all work is performed in accordance with INEEL MCP-3562 and STD-101.

3.1.3 ESH&Q Oversight

The ESH&Q oversight personnel are the primary source for information regarding hazardous and toxic agents at the site. The ESH&Q oversight personnel assess the potential for worker exposures to hazardous agents according to the INEEL Safety and Health Manual 14B, MCPs, PRDs, and accepted industrial hygiene practices and protocol. The ESH&Q oversight personnel will provide oversight (relative to their specific discipline) to ensure that work is performed in accordance with MCP-3562 and STD-101. By participating in site characterization, ESH&Q oversight personnel assess and recommend appropriate hazard controls for the protection of site personnel, and operate and maintain airborne sampling and monitoring equipment, as appropriate. The ESH&Q oversight personnel also recommend and assess the use of personal protective equipment (PPE) in the project health and safety plan (HASP), *Health and Safety Plan for the Field Sampling and Remediation of the V-Tank Area New Sites at Waste Area Group 1, Operable Unit 1-10* (ICP 2004a), or other health and safety documentation such as safe work permits or radiological work permits.

In the event of an evacuation, the ESH&Q oversight personnel, in conjunction with other recovery team members, will assist the PM in determining whether conditions exist for safe site reentry. Personnel showing symptoms of health effects resulting from possible exposure to hazardous agents will be referred to an occupational medical program physician by their supervisor or by ESH&Q oversight personnel. The ESH&Q oversight personnel may have other duties at the site, as specified in other sections of the HASP, PRDs, and/or MCPs. During emergencies involving hazardous materials, airborne sampling and monitoring will be coordinated with members of the Emergency Response Organization.

3.1.4 Waste Generator Services

The INEEL Waste Generator Services (WGS) waste technical specialist will ensure that disposition of waste material is in compliance with identified guidance. The WGS personnel have the responsibility to help solve waste management issues at the task site. Personnel also prepare the appropriate documentation for waste disposal and make the proper notifications, as required. All wastes will be managed and disposed according to the *Waste Management Plan for the V-Tank New Site at Test Area North, Waste Area Group 1, Operable Unit 1-10* (ICP 2004b).

3.1.5 Radiological Control

Radiological control personnel will be involved with all aspects of the project where radiation exposure is of concern. To monitor the work environment for field personnel and to ensure the safety of laboratory personnel at INEEL laboratories, all activities will comply with applicable MCPs. The radiological controls and personnel monitoring requirements established for this sampling effort in the project Health and Safety Plan are based on personnel dose received and radiological survey data collected during past work activities at the site. These data will be used to implement action levels (ALs) that will help ensure that all work activities and personnel exposure to direct radiation are maintained as low as reasonably achievable.

3.1.6 Sampling Team Leader

The sampling team leader (STL) reports to the FTL and has ultimate responsibility for the safe and successful completion of assigned project tasks, including:

- Overseeing the sampling team
- Ensuring that the samples are collected from appropriate locations
- Ensuring that proper sampling methods are employed, chain-of-custody procedures are followed, and shipping requirements are met.

If the STL leaves the task site, an alternate individual will be appointed to act in this capacity. An acting STL on the task site must meet all the same training requirements as the FTL, as outlined in the project HASP. The identity of the acting STL shall be conveyed to task-site personnel, recorded in the sampling logbook, and communicated to the FTL or designee, when appropriate. The STL may also be the FTL for the sampling event.

3.1.7 Sampling Team Members

The sampling team will consist of sampling personnel who are fully trained and skilled in the standard sampling procedures for sampling soils as well as decontamination procedures. All sampling team personnel will have qualifications in compliance with the project-specific training matrix. Waste management will be performed in accordance with the provisions outlined in the project-specific waste management plan.

Sampling team members will be trained to procedures for collection of representative sample and trained to the many TAN and INEEL environmental safety and health procedures and policies. Each member of the sampling team will be trained in accordance with the requirements outlined in the project HASP and work control work package.

3.2 Non-Field Team Members/Visitors

All persons on the work site who are not part of the field team (e.g., surveyor, equipment operator, or other craft personnel not assigned to the project) are considered non-field team members or visitors for the purposes of this project. A person will be considered "onsite" when they are present in or beyond the designated support zone. Per 29 CFR 1910.120 and 1926.65, non-field team members are considered occasional site workers and must comply with the following requirements:

- Receive any additional site-specific training identified in the project HASP prior to entering beyond the support zone of the project site
- Meet all required training for the tasks being performed, as identified in the project HASP
- Meet minimum training requirements for such workers as described in the OSHA standard
- Meet the same training requirements as the workers if the non-worker's tasks require entry into the work control zone.

Training must be documented and a copy of the documentation must be incorporated into the project field file. A site supervisor (e.g., health and safety officer or FTL) will supervise all non-field team personnel who have not completed their 3 days of supervised field experience, in accordance with the Hazardous Waste Operations (HAZWOPER) standard. Non-field team members/visitors may not be allowed beyond the support zone during certain project site tasks (e.g., drilling) to minimize safety and health hazards. The determination of any visitor's "need" for access beyond the support zone at the project site will be made by the health and safety officer in consultation with TAN Radiological Control (RadCon) personnel (as appropriate).

3.3 Points of Contact

Table 5 lists the key points of contact for the TAN, WAG 1, OU 1-10 field activities for the TSF-46, TSF-47, and TSF-48 sites. The personnel listed in the table are those persons to be contacted as a part of sampling operations. This table is subject to change due to reassignment of personnel. A current copy of this table will be posted at the job site for reference during all project activities. Revisions to this table will not require a Document Action Request because the current job positions will be posted at the job site.

Table 5. TSF-46, TSF-47, and TSF-48 sites points of contact.

Name	Title	Telephone Number
Lisa Wolford	TAN 607 Facilities Subproject Manager	526-3050
Al Jantz	WAG 1 Project Manager	526-8517
Dave Eaton	WAG 1 Environmental Compliance	526-7002
Gary McDannel	WAG 1 Project Engineer	526-5076
Lynn Schwendiman	TAN V-Tank Area New Sites Task Lead	526-8732
John Harris/Marshall Marlor	Waste Generator Services Contact	526-3461/526-2581
Robert Miklos	TAN Clean and Close Project Director	526-4072
B. D. Shagula	Health and Safety Officer	526-0580
Kirk Dooley	Field Team Leader/Engineer	526-2068
Nate Wegener/Kori Hatch	Industrial Hygienist	526-5213/9877
B. P. Shagula	Safety Engineer	526-0580
Bruce Hendrix	Fire Protection Engineer	526-7989
James Brady	Radiological Control Engineer	526-6944
Al Millhouse	Operations/Nuclear Facilities Manager	526-5932
James K. Rider	Quality Assurance Engineer	526-2534
Donna Haney	Sampling Team Leader	526-7050
Tracy Elder	Sample Analysis Management Contact	526-9873
Lex Strain	Construction Coordinator	526-6858

4. QUALITY OBJECTIVES

The following sections outline the objectives of the sampling activities and the development of data quality objectives for sampling and analysis activities for the TSF-46, TSF-47, and TSF-48 sites.

4.1 Data Quality Objectives

The data quality objective (DQO) process, which is used to specify, qualitatively and quantitatively, the objectives for the data collected, was designed as a specific planning tool to establish criteria for defensible decision making and to facilitate the design of the data acquisition efforts. The DQO process is described in the EPA document, *Data Quality Objectives Process for Hazardous Waste Site Investigations* (EPA 2000a). The DQO process includes seven steps, each of which has specific outputs. Each of the following subsections corresponds to a section in the DQO process, and provides the output for each step.

4.1.1 Problem Statement

The first step in the DQO process is to succinctly state the problem to be addressed for the soils in the area of concern. The concise problem statement describes the problem as it is currently understood, and the conditions that are causing the problem. Prior studies and existing information are reviewed to gain a sufficient understanding to define the problem.

The V-Tank Area New Sites have been identified for further assessment and remedial action (if necessary) under CERCLA. Previous DD&D activities in the new site areas have identified the potential existence of contaminated soils and the need for remediation. The ROD for OU 1-10 (DOE-ID 1999) identified Cs-137 as the only COC requiring remediation in soil, and established a FRG of 23.3 pCi/g to 10 ft bgs. If Cs-137 concentrations at 10-ft bgs and less are at or above 23.3 pCi/g, excavation of the contaminated soil is required. If Cs-137 concentrations are above 2.3 pCi/g but below 23.3 pCi/g, then further excavation will be done or institutional controls will be applied. The V-Tanks Area New Site soils will be excavated down to 10 ft bgs in cooperation with the DD&D and V-Tanks projects. Excavated soil will be stockpiled at or near the excavation sites for eventual disposal at ICDF. It is possible that some piles of soil may be placed into bags to facilitate onsite management of the soil. For the purposes of this FSP, a population of bagged soil will be treated the same as a pile of soil. After excavation, sampling for Cs-137 using a high-purity germanium detector will be done to confirm that remedial action goals have been achieved.

If any areas are found during either HWMA/RCRA closure or CERCLA activities that show evidence of a suspected release, postremediation soil sampling will be performed to analyze for V-Tank soil contaminants to support a risk-based screening assessment to determine the need for revised FRGs and further actions. The same criteria used for RCRA closure will be used by the CERCLA program for determining if the soil shows evidence of suspected release (visible staining, presence of breached or broken pipe, elevated radiation readings). Elevated radiation readings are defined in Section 5.2.1 as 1,000 disintegrations per minute (100 counts per minute [CPM] at 10% efficiency) above background (background not to exceed 300 CPM).

The problem statement is as follows: Contaminated soils in the area of concern will be excavated if the radiological contamination is greater than 23.3 pCi/g of Cs-137 and/or if the soil shows evidence of suspected release. After excavation of the contaminated soil, sampling and analysis of the soil will be conducted on the remaining soils to determine if remedial action goals have been achieved, or if further excavation and/or implementation of institutional controls is required.

4.1.2 Principal Study Questions and Decision Statements

This step in the DQO process identifies the decisions and actions that will be taken based on the data collected. The study questions and their corresponding alternative actions (AAs) will then be joined to form decision statements (DSs).

The objective of the soil sampling specified in this FSP, to manage soils in compliance with OU 1-10 ROD to ensure protectiveness of human health and environment, is to answer the following principal study questions (PSQ):

PSQ1: Is Cs-137 present in the soils associated with TSF-46, TSF-47, and TSF-48 in levels that are potentially harmful of human health?

For PSQ1, the Cs-137 concentration in soil that will be considered potentially harmful to human health is the OU 1-10 ROD value of 23.3 pCi/g at depths down to 10 ft bgs. The AAs associated with PSQ1 are as follows:

AA1.1: If concentrations of Cs-137 at depths < 10 ft bgs are present in levels at or above 23.3 pCi/g, then further remediation will take place

AA1.2: If concentrations of Cs-137 are present in levels at or above 2.3 pCi/g but less than 23.3 pCi/g, then either further remediation will take place or institutional controls will be put in place for the area.

AA1.3: If concentrations of Cs-137 at depths < 10 ft bgs are present in levels less than 2.3 pCi/g, then no further action will be taken with regard to Cs-137 in soils in TSF-46, TSF-47, or TSF-48.

Combining PSQ1 and its associated AAs result in the following DS:

DS1: Determine the concentration of Cs-137 in TSF-46, TSF-47, TSF-48 and evaluate if further remediation or the enactment of institutional controls is necessary.

If any soil shows evidence of a release, postremediation soil sampling at the bottom of the excavation will be performed to analyze for V-tank contaminants to support a risk-based screening assessment to determine the need for a potential revision to FRGs and subsequent further action. Further actions could consist of institutional controls, further remediation, or no action.

The PSQ associated with this aspect of the project is as follows:

PSQ2: Does soil showing evidence of a release contain COCs present in levels that are harmful to human health or the environment?

The AAs associated with PSQ2 are as follows:

AA2.1: If COCs are present in concentrations that are harmful of human health and the environment, then evaluate the need for potential revision to FRGs and the need for further actions.

AA2.2: If COCs are not present in concentrations that are harmful to human health and the environment, then no further action with regards to this area are required.

Combining PSQ2 and its associated AAs result in the following DS:

DS3: Determine if any soil showing evidence of a suspected release contains new COCs in concentrations that are harmful of human health and the environment, requiring potential revision to FRGs and a need for further actions.

The soils that are excavated for remediation purposes need to be characterized to ensure that they are meet the waste acceptance criteria for disposal. The PSQ associated with this aspect of the project is as follows:

PSQ3: Do the contaminated soils meet the criteria defined in the WAC for disposal at ICDF?

The AAs associated with PSQ3 are as follows:

AA3.1: If concentrations of COCs in contaminated soils meet the disposal criteria defined in the defined in the ICDF WAC, then soils will be disposed of at ICDF.

AA3.2: If contaminant concentrations in soils do not meet the disposal criteria defined in the ICDF WAC, they may be treated to meet the WAC and subsequently disposed of at ICDF.

AA3.3: If concentrations of COCs in contaminated soils do not meet the disposal criteria defined in the ICDF WAC, then disposal options at another facility may be evaluated.

Combining PSQ3 and its associated AAs results in the following DS:

DS3: Determine if contaminated soils meet the criteria defined in the WAC for disposal at ICDF, or if treatment and/or acceptance at another disposal facility needs to be pursued.

4.1.3 Decision Inputs

The purpose of this step is to identify informational inputs that will be required to resolve the DSs and to determine which inputs require measurements. The information required to resolve DS1 is the quantification of Cs-137 in soils within the TSF-46, TSF-47, and TSF-48 sites. The informational inputs required to resolve DS2 is the identification and quantification contaminants of concern in any soils showing evidence of a suspected release. The information required to resolve the DS3 is the identification and quantification of COCs necessary to determine if the criteria for waste disposal at ICDF has been met.

4.1.4 Study Boundaries

The primary objectives of this step are to identify the population of interest, define the spatial and temporal boundaries that apply to the DSs, define the scale of decision-making, and identify practical constraints that must be considered in the sampling design. Implementing this step helps ensure that the sampling design will result in the collection of data that accurately reflect the true condition of the site under investigation.

Step 4 in the DQO process defines the physical and temporal boundaries of the study. The spatial boundaries simply define the physical extent of the study area and may be subdivided into specific areas of interest. The temporal boundaries define the duration of the study, or specific parts of the study. The appropriate outputs of this setup are a detailed description of the spatial and temporal boundaries of the problem and a discussion of any practical constraints that may interfere with the study.

The physical boundaries of the V-Tank Area New Sites are the subunits defined below:

- TSF-46 – Soil within the TAN-616 footprint and the sloped excavation outside the footprint on the north, south, and west sides
- TSF-47 – Soil surrounding the leaking portion of the sanitary waste line lying underneath and to the west of TAN-615
- TSF-48 – Soil beneath and around the TAN-615 southeast and southwest pits/sumps.

The temporal boundary refers to both the timeframe over which each DS applies (e.g., number of years) and when the data should optimally be collected (e.g., season, time of day, and weather conditions). The primary constraint, expected to be encountered that would interfere with the performance of the sampling outlined in this FSP, is the project's dependence on the DD&D and V-Tanks projects schedules for sampling and excavation activities. Any limitations to data quality/usability introduced by sample collection constraints (inaccessibility of some sample locations) will be discussed in the data quality assessment report(s).

4.1.5 Decision Rules

The objective of this step is to define parameters of interest that characterize the population, specify the action level, and integrate previous DQO outputs into a single statement that defines the conditions that would cause the decision maker to choose among AAs. The decision rule typically takes the form of an "***If…then***" statement describing the action to take if one or more conditions are met.

The decision rule is specified in relation to a parameter that characterizes the population of interest. The parameter of interest for the soil samples will be the true mean concentration, as estimated by the 95% upper confidence limit (UCL), of the sample mean. Therefore, the sample statistic of interest for the soils will be the 95% UCL of the sample mean concentration. Since Cs-137 has been identified as the COC for TSF-46, TSF-47, and TSF-48 soils, the FRG has been specified as the action level for this radionuclide. The FRG for Cs-137 is 23.3 pCi/g at depths of <10 ft bgs.

- *If* the true mean concentration of Cs-137 in TSF-46, TSF-47, or TSF-48 exceeds the FRG, *then* further excavation will be considered.
- *If* the true mean concentration of Cs-137 in TSF-46, TSF-47, or TSF-48 does not exceed the FRG but is greater than 2.3 pCi/g, *then* implementation of institutional controls will be considered.
- *If* the true mean concentration of Cs-137 in TSF-46, TSF-47, and TSF-48 does not exceed the FRG, *then* confirmation sampling of the soils will take place to determine if the FRGs have been met.
- *If* the true mean concentration of COCs in any soils where there is evidence of a release are potentially harmful of human health and the environment, *then* evaluate the need to revise FRGs and perform further actions.
- *If* the true mean concentrations of COCs in any soils where there is evidence of a release are not harmful of human health and the environment, then no action will be taken with respect to these soils.

- *If* the true mean concentration of COCs for the soils intended for disposal at ICDF fails to meet the criteria for waste disposal at ICDF as outlined in the WAC, *then* treatment and/or disposal options at other facilities will be evaluated.

- *If* the true mean concentration of COCs for the contaminated soils meets the criteria for waste disposal at ICDF as outlined in the WAC, *then* the soils will be disposed of at ICDF.

4.1.6 Decision Error Limits

Since analytical data can only estimate the true condition of the site under investigation, decisions based on measurement data could potentially be in error. For this reason, the primary objective of this step is to minimize data uncertainty by specifying tolerable limits on decision errors that are used to establish performance goals for the data collection design.

Because decisions are based on measurement data, which provide only an estimate of the true state of the media being characterized, decisions based on that data could be in error. Tolerable limits on the probability of making a decision error must be defined. The probability of decision errors can be controlled by using the data to select between one condition of the environment (i.e., soil) and the alternative condition. One condition is assumed to be the baseline condition and is referred to as the *null hypothesis* (Ho). The alternative condition is the *alternative hypothesis* (H»). The null hypothesis is presumed to be true in the absence of strong evidence to the contrary, which allows decision-makers to guard against making the decision error with the most undesirable consequences.

A decision error occurs when the decision-maker rejects the null hypothesis when it is true, or fails to reject the null hypothesis when it is false. These two types of decision errors are classified as *false positive* and *false negative* decision errors, respectively. False positive and false negative errors are defined in terms of the definition of the null and alternative hypotheses. For example, a decision-maker presumes a certain waste is hazardous (i.e., the null hypothesis is "the waste is hazardous"). If the data causes the decision-maker to conclude that the waste is not hazardous when it truly is hazardous, then the decision-maker would make a false positive decision error. Statisticians refer to this error as a Type I error. The measure of the size of this error is called alpha (α), the level of significance, or the size of the critical region. If, however, the data causes the decision-maker to conclude that the waste is hazardous when, in fact, it is not, then the decision-maker would make a false negative decision error. Statisticians refer to this error as a Type II error. The measure of the size of this error is called beta (β), and is also known as the compliment of the power of a hypothesis test.

Decision error cannot be eliminated but it can be minimized by controlling the total study error. Methods for controlling total study error include collecting a large number of samples (to control sampling design error), analyzing individual samples several times, or using more precise analytical methods (to control measurement error). The chosen method for reducing decision errors depends on where the greatest component of total study error exists in the data set and the ease in reducing the error contributed by those data components. The amount of effort expended on controlling decision error is directly proportional to the consequences of making an error.

The decision error that has the more severe consequences as the true concentrations of the parameters of interest approach the action level (AL) must be specified, as it is the basis for establishing the null hypothesis. This decision error is used because as the parameters approach the AL, the data are much more likely to lead to an incorrect decision than when the parameters are far above or below the AL. For regulatory compliance, human health, or environmental risk issues, the decision error that has the most adverse consequences will be favored as the null hypothesis.

The null hypothesis for soils in TSF-46, TSF-47, and TFS-48 is that the concentration of Cs-137 in the soils exceeds the OU 1-10 FRG. The alternative hypothesis is that the concentration of Cs-137 in the soils is less than the FRG.

The decision associated with DS2 is based on a risk analysis. A risk analysis is not a statistical hypothesis test and therefore it would be inappropriate to define null and alternative hypotheses for this decision. It is also inappropriate to define decision errors or other statistical parameters for this DS.

The null hypothesis for soils intended for disposal at ICDF is that the concentrations of at least one COC in the contaminated soils exceed the requirements in the ICDF WAC. The alternative hypothesis is that the concentration of all COCs in the soils intended for disposal at ICDF meets the ICDF WAC requirements.

A range of possible parameter values must be specified where the consequences of decision errors are relatively minor. This range of values is referred to as the "gray region," which is bounded on one side by the AL and on the other side by the parameter value where making a false negative decision error begins to be significant (U). It is necessary to specify the gray region because the variability in the sample population and unavoidable imprecision in the measurement system combine to produce variability in the data such that a decision may be "too close to call" when the true parameter value is very close to the AL. In statistics, this interval is called the "minimum detectable difference" and is expressed as delta (Δ). The width of this gray region is critical in calculating the number of samples needed to satisfy the DQOs. A narrow gray region indicates a desire to detect conclusively the condition when the true parameter value is close to the AL.

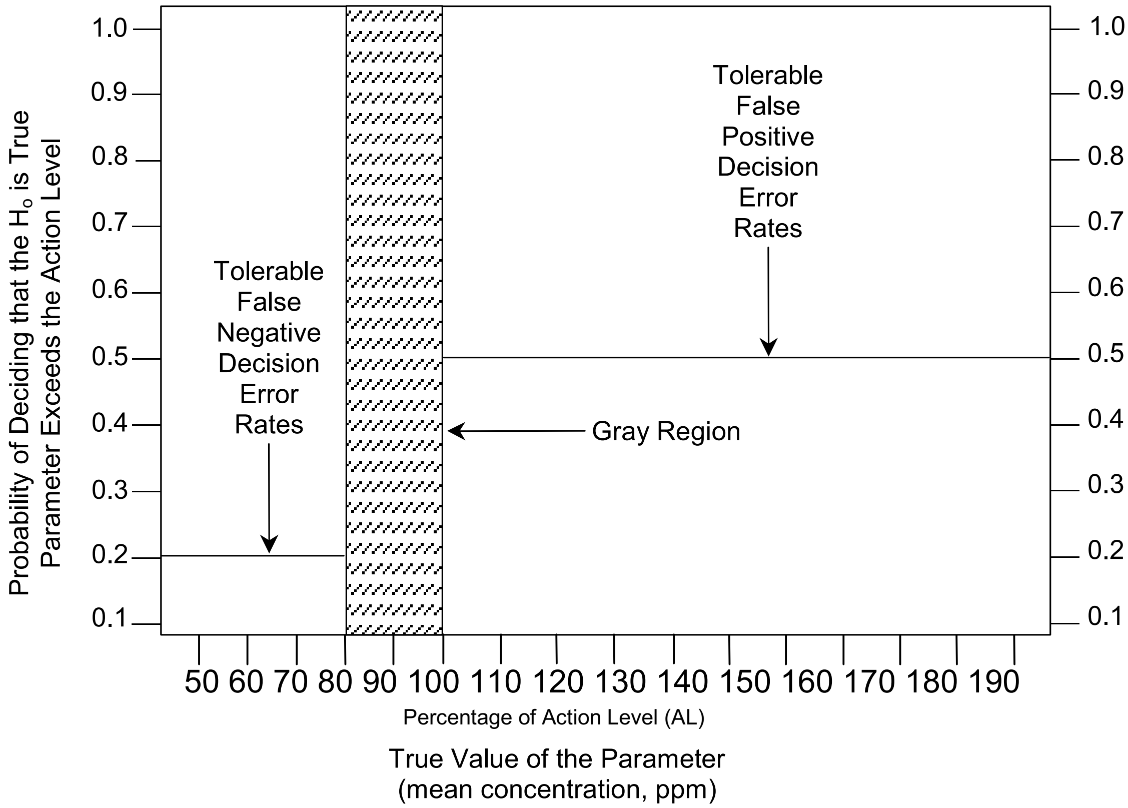
The final activity required in specifying the tolerable limits on decision error is to assign values to the gray region that reflects the probability of decision errors occurring. These probability values are the decision-maker's tolerable limits for making an incorrect decision. These values are determined by selecting a possible true value for the parameter of interest, then choosing a probability limit based on an evaluation of the seriousness of the potential consequences of making a decision error if the true parameter value is located at that point. From a practical standpoint, the gray region is an area where it will not be feasible to control false negative decision error rates to low levels because of high costs.

As the costs associated with making a false negative decision error are relatively high for this remediation sampling activity, a rather narrow gray region is appropriate. For total constituent analysis, the gray region will be bounded on one side by the constituent-specific AL and on the other side by a value that is 80% of the constituent-specific AL.

The final activity required in specifying the tolerable limits on decision error is to assign limits to points above and below the gray region that reflect the probability of occurrence of decision errors. These probability values are the decision-maker's tolerable limits for making an incorrect decision. This is done by selecting a possible true value for the parameter of interest, then choosing a probability limit based on an evaluation of the seriousness of the potential consequences of making a decision error if the true parameter value is located at that point. The EPA guidance recommends evaluating sampling designs starting with a 1% (0.01) decision error rate. This percentage should not be considered a prescriptive value for setting decision error rates nor a policy of EPA, but merely a starting point from which to develop decision errors appropriate to the study. These concepts are presented in Figure 4.

The project team must use three variables and adjust them to acceptable tolerances: (a) width of gray region, (b) acceptable false positive decision error rate when the true mean concentration is equal to the AL, and (c) acceptable false negative decision error rate when the true mean concentration is equal to U). Then, using the values and an estimate of the variability of the population (σ^2), the number of samples required to satisfy the DQOs can be determined.

The sample collection design for the V-Tank Area New Sites sampling activities is discussed in the following section. For this sampling design, an acceptable false positive decision error value of 0.05 and a minimum acceptable false negative decision error value of 0.20 has been selected for soils at TSF-46, TSF-47, and TSF-48.



Baseline condition: Parameter exceeds action levels.

True Concentration	Correct Decision	Type of Error	Tolerable Probability of Incorrect Decision
<80% AL	Does not exceed	F(-)	20%
80 to 100 AL	Does not exceed	F(-)	Gray region
>100% AL	Does exceed	F(+)	5%

Figure 4. Example of a decision performance goal diagram and corresponding decision error limits table.

4.1.7 Design Optimization

The objective of this step is to identify the sampling and analysis design that best satisfies the previous DQO Steps 1 through 6. The outputs of the first six steps have been discussed previously. Sample collection for the TSF-46, TSF-47, and TSF-48 sites will be based on a dynamic work plan approach. In a static work plan, samples are collected in predetermined locations without consideration for knowledge gained from field sampling/screening results. A dynamic work plan allows the FSP to adapt as information is obtained in the field. The dynamic approach has the potential to offer rapid definition of areas that require further excavation and is an effective method for identifying when sufficient information has been collected to guide decisions. This is accomplished by concentrating the sampling frequency in the areas where contamination has been identified while reducing the frequency of sampling in areas observed to be uncontaminated.

There exists environmental data relevant to the TSF-46, 47 and 48 sites, the soil in the area surrounding the V-tanks, as well as historical operations data regarding V-tank contents. Previous soil samples analyzed from the V-tank area of contamination have indicated that Cs-137 is an indicator of other COCs, as discussed in the "TSF-09/18 Calendar Year 2003 Early Remedial Action Activities Summary Report for Waste Area Group 1, Operable Unit 1-10 (Draft).[a] Based on this premise, field surveys for the gamma radiation from Cs-137 activity can be used to guide the sampling at each site.

The activities required to optimize the design include:

- Reviewing the outputs of the first six steps and existing environmental data
- Developing general data collection design alternatives
- Formulating a mathematical expression needed to solve the design problem for each data collection design alternative
- Selecting the optimal number of samples to satisfy the DQOs for each data collection design alternative
- Selecting the most resource-effective data collection design that satisfies all the DQOs.

Samples taken from the soil left in place after excavation of TSF-46, TSF-47, and TSF-48 will be used to resolve DS1. These areas will be sampled postexcavation to confirm whether remediation efforts have been successful. Sampling at the sites will be performed using the High-Purity Germanium (HPGe) gamma spectrometer. The areas will be divided into appropriately sized grids, and wide-area surveys performed in each grid using a HPGe gamma spectrometer. A sufficient number of wide-area surveys will be taken to obtain 100% coverage of the area.

Results from these wide-area surveys will be used to confirm whether remedial action objectives have been achieved, or whether further remediation is needed. If results from the wide-area confirmation surveys show Cs-137 activity greater than 23.3 pCi/g, additional excavation will be undertaken to remove areas with elevated levels of contamination. These areas will be resurveyed postexcavation. When results from the wide-area surveys show Cs-137 activity less than 23.3 pCi/g, remediation will be deemed complete.

Additional biased samples will be collected in areas where there is evidence of a suspected release. A minimum of three grab samples in the area of the suspected release will be collected as bias samples and will be analyzed separately, without compositing, to conservatively estimate the mean concentration of COCs at the suspected release point. The biased samples will be collected based on the three highest radiation readings within the area of suspected release so as to provide a conservative estimate of COC concentrations. A risk analysis will be completed on these samples results to determine if additional COCs are present and evaluate if a potential revision to the OU 1-10 ROD FRGs and further action are warranted.

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a. ICP, 2004, "TSF-09/18 Calendar Year 2003 Early Remedial Action Activities Summary Report for Waste Area Group 1, Operable Unit 1-10 (Draft)," ICP/EXT-03-00080, Rev. 0, Draft, Idaho Completion Project, August 2004.

A composite random sampling method will be used for sampling the excavated soil intended for disposal at ICDF. Fifteen samples from various locations and depths will be collected from each soil pile. Groups of three samples will be composited to obtain five composite random samples to be sent to the lab for analysis.

It is possible that one or more of the soils piles may be placed in bags before sampling. In this case, fifteen bags will be randomly selected and one sample will be taken from each selected bag. Groups of three samples will be composited for a total of five composite random samples. After samples have been collected and analyzed, a one-sample *t*-test, or other appropriate statistical comparison, will be performed during the data assessment phase of the project to determine whether the acceptance criteria outlined in the *ICDF Complex Waste Verification Sampling and Analysis Plan* (DOE-ID 2003c) have been met.

5. SAMPLING PROCESS DESIGN

Specific procedures are required to handle the samples collected during the V-Tank Area New Sites sampling activities to ensure that the data are representative of the soil within the TSF-46, TSF-47, and TSF-48 sites. This section outlines the specific sampling process design for these activities. The sampling requirements discussed here will guide the collection of representative samples as specified in the DQOs (Section 4.1 of this plan). Procedures for sample collection are provided as guidelines for the field sampling team.

5.1 Presampling Meeting

Sampling procedures will be discussed each day in a presampling meeting. The meeting discussion will include, but is not limited to, sampling activities for the day, responsibilities of team members, health and safety issues, radiological conditions, and waste management. The FTL will evaluate and apply Human Performance techniques to ensure that the appropriate defenses are in place (prior to the commencement of work) to ensure that identified error precursors are eliminated or mitigated. The Human Performance techniques shall also be applied when the scope of work or conditions change. Any deviations from the sampling strategy presented in this FSP will be documented in the field-sampling logbook.

5.2 Sampling Collection

Prior to sampling gridded areas, sample locations will be identified, staked, and clearly marked with the appropriate designations. Staked sampling locations will be surveyed in accordance with the requirements set forth in MCP-3480, "Environmental Instructions for Facility, Processes, Materials and Equipment," Sections 4.98.11.3 and 4.98.11.4, to establish horizontal (northing and easting coordinates) and vertical (elevation referenced to mean sea level) control. Permanent benchmarks and control points referenced to North American Datum 1927 (NAD 27), National Geodetic Vertical Datum 1929 (NGVD 29) will be used to reference the vertical control data and the horizontal grid coordinates.

Horizontal (H) and vertical (V) control will be consistent with standard third order accuracy,

where

H = 1/5,000 or 5 seconds of arc

V = 0.05 ft per M (length of loop in miles).

Sampling at the TSF-46, TSF-47 and TSF-48 sites will be done postremediation using a field calibrated in situ high-purity germanium (HPGe) gamma spectrometer. A partial listing of radionuclides identified with this system is: K-40, Co-60, Sb-125, Cs-137, Eu-152, Eu-154, Ti-208 (Th-232 daughter), Pb-214, Bi-214, Ra-226, Pa-234m (U-238 daughter), U-235, and U-238. Concentrations are typically reported in pCi/g, with 1-sigma counting uncertainty. All results are reported along with uncertainties and minimum detectable activities.

In situ gamma spectrometer systems are used in two modes, field and sample. Field mode will be used for sampling of the V-Tank Area New Sites. In field mode, a 40–60 % efficient high-purity germanium (HPGe) detector is placed on a tripod, and pointed in a downward direction. The height of the detector above the ground surface determines the field of view the detector "sees." This height can be easily varied such that the detector field of view can range from 10 to 70 ft in diameter. The detectors are laboratory calibrated using NIST traceable point sources, and quality control checks are performed and charted on every detector at least twice weekly.

Sampling at the TSF-46, TSF-47 and TSF-48 sites will be done postremediation. The areas will be divided into grids, and wide-area surveys performed in each grid using a HPGe gamma spectrometer. A sufficient number of wide-area surveys will be taken to obtain 100% coverage of the area. Results from these wide-area surveys will be used to confirm whether remedial action objectives have been achieved, or whether further remediation is needed. If results from the wide-area confirmation surveys show Cs-137 activity greater than 23.3 pCi/g, additional excavation will be undertaken to remove areas with elevated levels of contamination. These areas will be resurveyed postexcavation. When results from the wide-area surveys show Cs-137 activity less than 23.3 pCi/g, then remediation activities will be considered complete for the site and site restoration and/or the application of institutional controls will proceed.

If areas are identified where there is evidence of a suspected release, postremediation soil samples at the bottom of the excavation will be collected and the samples analyzed for V-Tank soil contaminants. A risk analysis will be completed for these samples using the risk-based screening process outlined in the *Risk-Based Screening Approach for Waste Area Group 1 Soils,* (INEEL 2004a) to determine if additional COCs are present and evaluate if a potential revision to the OU 1-10 ROD FRGs is warranted.

Soil removed from the TSF-46, TSF-47, and TSF-48 sites will be either bagged or stockpiled at or near the excavation site, or at a CERCLA storage areas, for subsequent disposal at ICDF. Samples will be collected from each of the soil pile(s) (or collection of bagged soil), composited, and analyzed using conventional methods to characterize the soil for acceptance into ICDF, as described in Section 5.2.4.

Table 6 lists the planned sampling locations, the number of samples required, and the analyses that will be performed on each sample. These tables are subject to change based on results from field surveys; any changes will be noted in the sample logbook.

Table 6. Sample locations and analyses performed.

Site	Location	Number of Samples	Analyses
TSF-46/48	Excavated soil from within and outside the TAN-616 footprint	Five composite samples from each collection of bags or pile of excavated soil.	Contract laboratory program (CLP) Metals, PCBs, SVOCs (CLP-target analyte list [TAL]), VOC (CLP-TAL), TCLP (metals, VOCs, SVOCs), Gamma Spectroscopy, Am-241, Cm-isotopic, I-129, Ni-63, Np-237, Pu-isotopic, Ra-226, Sr-90, Tritium, U-isotopic
	Excavated soil and debris (concrete rubble) from within and outside the TAN-616 footprint	Five composite samples from each collection of bags or pile of excavated soil.	CLP Metals, PCBs, SVOCs (CLP-TAL), VOC (CLP-TAL), TCLP (metals, VOCs, SVOCs), Gamma Spectroscopy, Am-241, Cm-isotopic, I-129, Ni-63, Np-237, Pu-isotopic, Ra-226, Sr-90, Tritium, U-isotopic
	Additional bias samples	As needed based on specified field conditions (minimum of three)	CLP Metals, PCBs, SVOCs (CLP-TAL), VOC (CLP-TAL), TCLP (metals, VOCs, SVOCs), Gamma Spectroscopy, Am-241, Cm-isotopic, I-129, Ni-63, Np-237, Pu-isotopic, Ra-226, Sr-90, Tritium, U-isotopic
	Confirmatory Samples	Sufficient number of wide-area surveys to cover the entire area	Cs-137 using HPGe a
TSF-47	Excavated soil from around and beneath sewer line	Five composite samples from each collection of bags or pile of excavated soil.	CLP Metals, PCBs, SVOCs (CLP-TAL), VOC (CLP-TAL), TCLP (metals, VOCs, SVOCs), Gamma Spectroscopy, Am-241, Cm-isotopic, I-129, Ni-63, Np-237, Pu-isotopic, Ra-226, Sr-90, Tritium, U-isotopic
	Additional bias samples	As needed based on specified field conditions (minimum of three)	CLP (metal, VOCs, SVOCs,), PCBs, CLP Metals, PCBs, SVOCs (CLP-TAL), VOC (CLP-TAL), Gamma Spectroscopy, Am-241, Cm-isotopic, I-129, Ni-63, Np-237, Pu-isotopic, Ra-226, Sr-90, Tritium, U-isotopic
	Confirmatory Samples	Sufficient number of wide-area surveys to cover the entire area	Cs-137 using HPGe a

Table 6. (continued).

Site	Location	Number of Samples	Analyses
TSF-48	Excavated soil from beneath TAN-615 sump area	See TSF-46	See TSF-46 Analyses
	Bias and Confirmatory Samples	Included in sampling of excavated soil from TSF-46	See TSF-46
a. If additional COCs other than Cs-137 are identified from previous sampling efforts, characterization samples will be analyzed for those COCs also.			

5.2.1 TSF-46, TAN-616 Soil

Soil samples will be collected for the TSF-46 site under this FSP in conjunction with sampling for RCRA closure of the facility. The TAN-616 RCRA closure is described in the HWMA/RCRA Closure Plan for the facility (DOE-ID 2004e). Numerous samples of soil will be collected beneath the TAN-616 floor slab during closure of the facility, as described in the *Field Sampling Plan for the HWMA/RCRA Closure of the TAN 616 Liquid Waste Treatment Facility,* (INEEL 2004b) and used to demonstrate that the soils do not pose a risk to human health based on an excess cancer risk threshold of 1.0E-06 and a hazard index threshold of 1.

The following soils that are part of the TSF-46 site will be sampled and the samples analyzed for the COCs identified in the HWMA/RCRA closure plan and the resulting analytical data provided to the CERCLA program.

- Beneath the TAN-616 Pump Room floor and sump (five systematic random samples; one biased random sample beneath the pump room sump).
- Beneath the TAN-616 Evaporator Pit floor and sump (five systematic random samples; one biased random sample beneath the evaporator pit sump).

Figure 5 shows the locations of soil samples within the TSF-46 site that will be collected under TAN-616 closure activities. Additional biased samples will be collected during closure where the soil shows visible evidence of release or where field radiological measurements indicate elevated radiation readings (hot spots). The same criteria used for RCRA closure will be used by the CERCLA program for determining if the soil shows evidence of suspected release (visible staining, presence of breached or broken pipe, elevated radiation readings). Elevated radiation readings are defined as 1,000 disintegrations per minute (100 counts per minute [CPM] at 10% efficiency) above background (background not to exceed 300 CPM).. These samples will be analyzed for the COCs identified in the HWMA/RCRA closure plan and the resulting analytical data provided to the V-Tank Area New Sites project.

Sampling within and outside of the TAN-616 footprint under this FSP will be performed after closure activities at TAN-616 are nearing completion, and the area has been excavated to at least 10 ft bgs. Therefore, postremediation wide-area confirmation surveys with the HPGe will be performed at the TSF-46 site. Additional bias samples will be collected in any areas that show evidence of a suspected release. Figure 6 shows the area of concern for TSF-46.

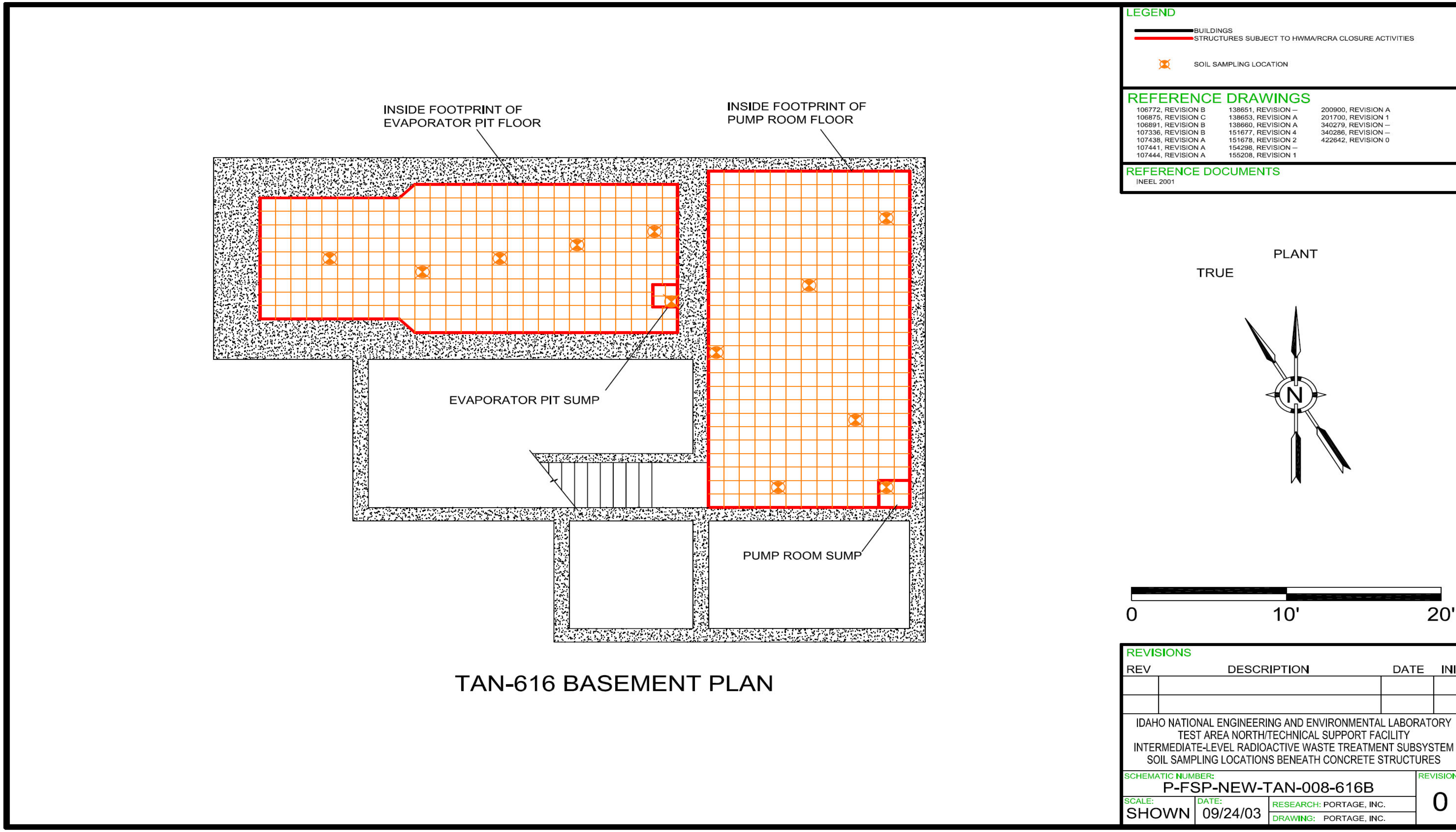

Figure 5. Sample locations from RCRA closure of TAN-616.

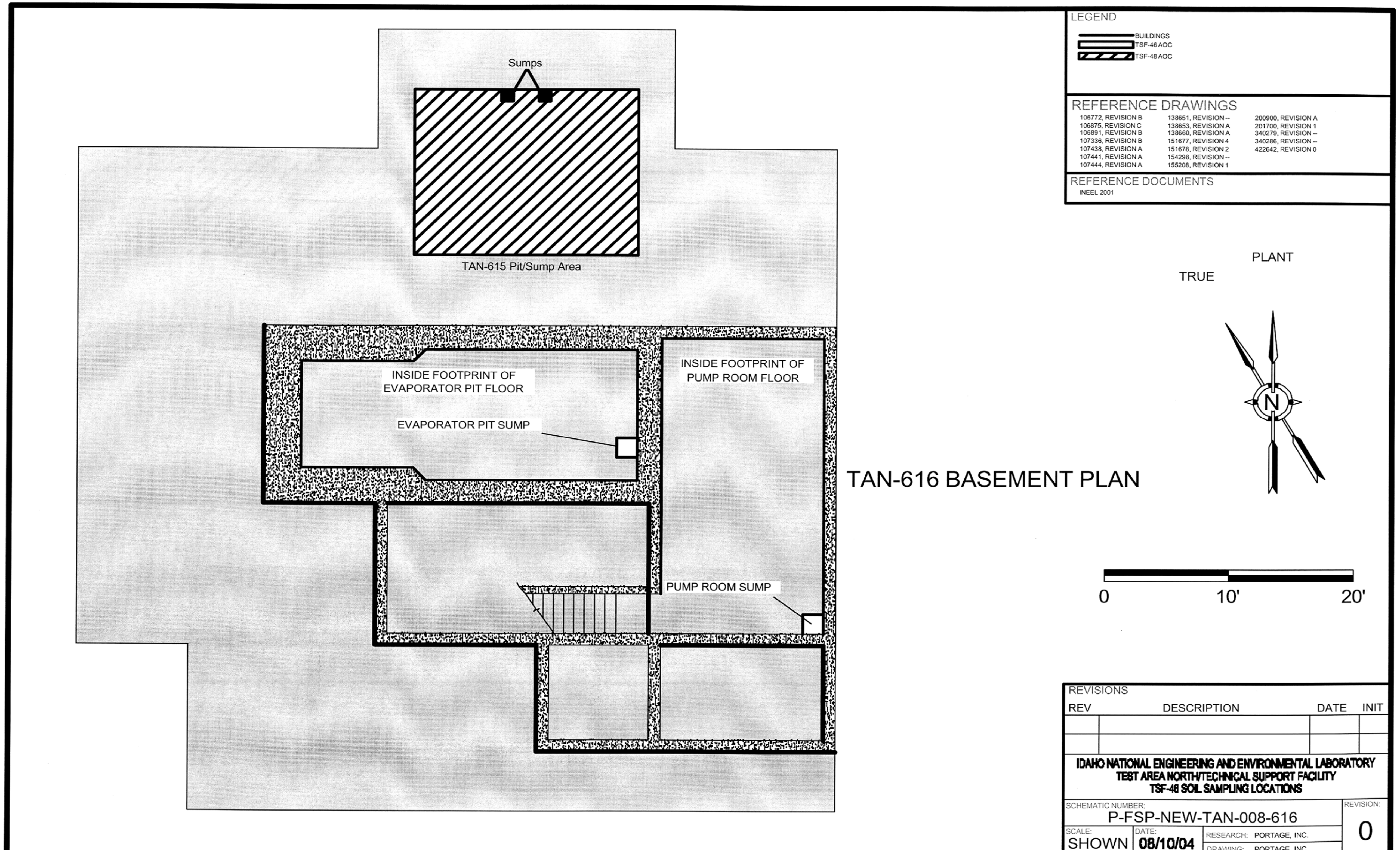

Figure 6. TSF-46 and TSF-48 Area of Concern.

5.2.1.1 Confirmatory Sampling.

Samples within and outside of the TAN-616 footprint will be collected after excavation. During closure, the soil will be excavated beneath the floor and away from the building foundation with a slope ratio of 1 to 1.5. Soil from the excavation will be stockpile (or bagged) at or near the excavation site. Bagged soil may be taken to a CERCLA soil storage area. After the initial excavation, the bottom of each excavated area will be divided into appropriate grids, each approximately 35 ft square. Each grid will be subjected to a wide-area survey (50 ft in diameter) with a high-purity germanium detector. These wide-area surveys will cover essentially 100% of the excavated area.

Results from these wide-area surveys will be used to determine whether remedial action objectives have been achieved, or whether further remediation is needed. If results from the wide-area confirmation surveys show Cs-137 activity greater than 23.3 pCi/g at the 95% UCL, the HPGe may be reconfigured to screen a smaller diameter area or the area may be surveyed with a hand-held instrument to get a more accurate location of the hot spot. If additional excavation is undertaken to remove areas with elevated levels of contamination, these areas will be resurveyed postexcavation. When results from the wide-area surveys show Cs-137 activity less than 23.3 pCi/g, then remediation activities will be considered complete for the site and site restoration and/or the application of institutional controls will proceed.

5.2.1.2 Sampling to Identify Potential New FRGs.

As mentioned earlier, if areas where there is evidence of a suspected release are identified during HWMA/RCRA closure activities, biased samples will be collected under the closure FSP, analyzed for the COCs identified in the closure plan, and the resulting analytical data provided to the V-Tank Area New Sites project. The OU 1-10 ROD Amendment (DOE-ID 2004c) requires that postremediation soil sampling be performed at the bottom of the excavation in these areas, and a risk assessment be performed on the results to evaluate the need for a potential revision to the FRGs and determine the need for further actions. Therefore, if any areas of suspected release are identified and sampled during closure, these same locations will be selected for postremediation sampling under this FSP.

Areas where there is evidence of suspected release could be discovered during the sampling activities outlined in this FSP. If any new areas are identified, biased samples will be collected from these locations as well. The same criteria for determining hot spots that was used for the purposes of the TAN-616 closure will be used for the CERCLA determination: an area will be considered as having elevated radiation readings if the readings are 1,000 disintegrations per minute (100 CPM at 10% efficiency) above background (background not to exceed 300 CPM) in areas where radioactive contamination would not normally be found. If areas of elevated activity are detected during wide-area surveys, the HPGe may be reconfigured to screen a smaller diameter area or the area may be surveyed with a hand-held instrument to get a more accurate location of the hot spot.

A minimum of three grab samples will be collected as bias samples from areas of suspected release and will be analyzed separately, without compositing, to conservatively estimate the mean concentration of COCs at the suspected release point. These biased sample location will be sampled post remediation, and the samples analyzed for V-tank contaminants. The biased samples will be collected based on the three highest radiation readings within the area of suspected release so as to provide a conservative estimate of COC concentrations. A risk analysis will be completed on these samples results using the risk-based screening process outlined in the *Risk-Based Screening Approach for Waste Area Group 1 Soils,* (INEEL 2004a) to determine if additional COCs are present and evaluate if a potential revision to the OU 1-10 ROD FRGs is warranted.

5.2.2 TSF-47, TAN-615 Sewer Line Soils

Analytical results (Table 2) from samples collected in 2002 at a depth of 10–11 ft along the sanitary/industrial waste line show Cs-137 above the OU 1-10 ROD FRG of 23.3 pCi/g. Therefore, the soil around and beneath the sewer line will be excavated and the soil stockpiled for disposal. The initial excavation will be along the sewer line, 5 ft in each direction from a predetermined center point. These excavations will extend to a width of approximately 5 ft on either side of the sewer line, and to a minimum depth of 10 ft bgs, as shown in Figure 7.

The sewer line runs just north of TAN-633 and underneath the north end of TAN-615 in an east to west direction (see Figure 7). Exact GPS coordinates at the center point of the sewer line were not obtained by D&D at the time of the initial excavation. Instead, GPS coordinates were taken at a point in the road above the sewer line in front (west side) of the former TAN-615 building. The coordinates (N 43 degrees 50' 59", W 112 degrees 42' 18.3") are from a point in the road that is 39 ft west of the sewer line leak (or the sewer line leak is 39 ft east of these GPS coordinates).

5.2.2.1 Confirmatory Sampling. Once the initial soil removal action has been completed, the excavated area around the sewer line will be gridded into 10 ft square grids. Each grid will be subjected to a wide-area confirmation survey (15 ft in diameter) with a high-purity germanium detector. These wide-area surveys will cover essentially 100% of the excavated area.

Results from these wide-area surveys will be used to determine whether remedial action objectives have been achieved, or whether further remediation is needed. If results from the wide-area confirmation surveys show Cs-137 activity greater than 23.3 pCi/g at the 95% UCL, the HPGe may be reconfigured to screen a smaller diameter area or the area may be surveyed with a hand-held instrument to get a more accurate location of the hot spot. If additional excavation is undertaken to remove areas with elevated levels of contamination, these areas will be resurveyed postexcavation. When results from the wide-area surveys show Cs-137 activity less than 23.3 pCi/g, then remediation activities will be considered complete for the site and site restoration and/or the application of institutional controls will proceed.

5.2.2.2 Sampling to Identify Potential FRGs. The sewer line had apparently leaked when it was discovered by DD&D in 2002. Therefore, a minimum of three (3) grab samples in the area of the suspected release will be collected as bias samples and will be analyzed separately, without compositing, to conservatively estimate the mean concentration of COCs at the suspected release point. It is also possible that areas where there is evidence of suspected release could be discovered during the sampling activities outlined in this FSP. If any new areas are identified, three biased samples will be collected from these locations as well. The same criteria for determining hot spots that was used for the purposes of the TAN-616 closure will be used for the CERCLA determination: an area will be considered as having elevated radiation readings if the readings are 1,000 disintegrations per minute (100 CPM at 10% efficiency) above background (background not to exceed 300 CPM) in areas where radioactive contamination would not normally be found.

These biased sample location will be sampled postremediation, and the samples analyzed for V-tank contaminants. The biased samples will be collected based on the three highest radiation readings within the area of suspected release so as to provide a conservative estimate of COC concentrations. A risk analysis will be completed on these samples results using the risk-based screening process outlined in the *Risk-Based Screening Approach for Waste Area Group 1 Soils,* (INEEL 2004a) to determine if additional COCs are present and evaluate if a potential revision to the OU 1-10 ROD FRGs is warranted.

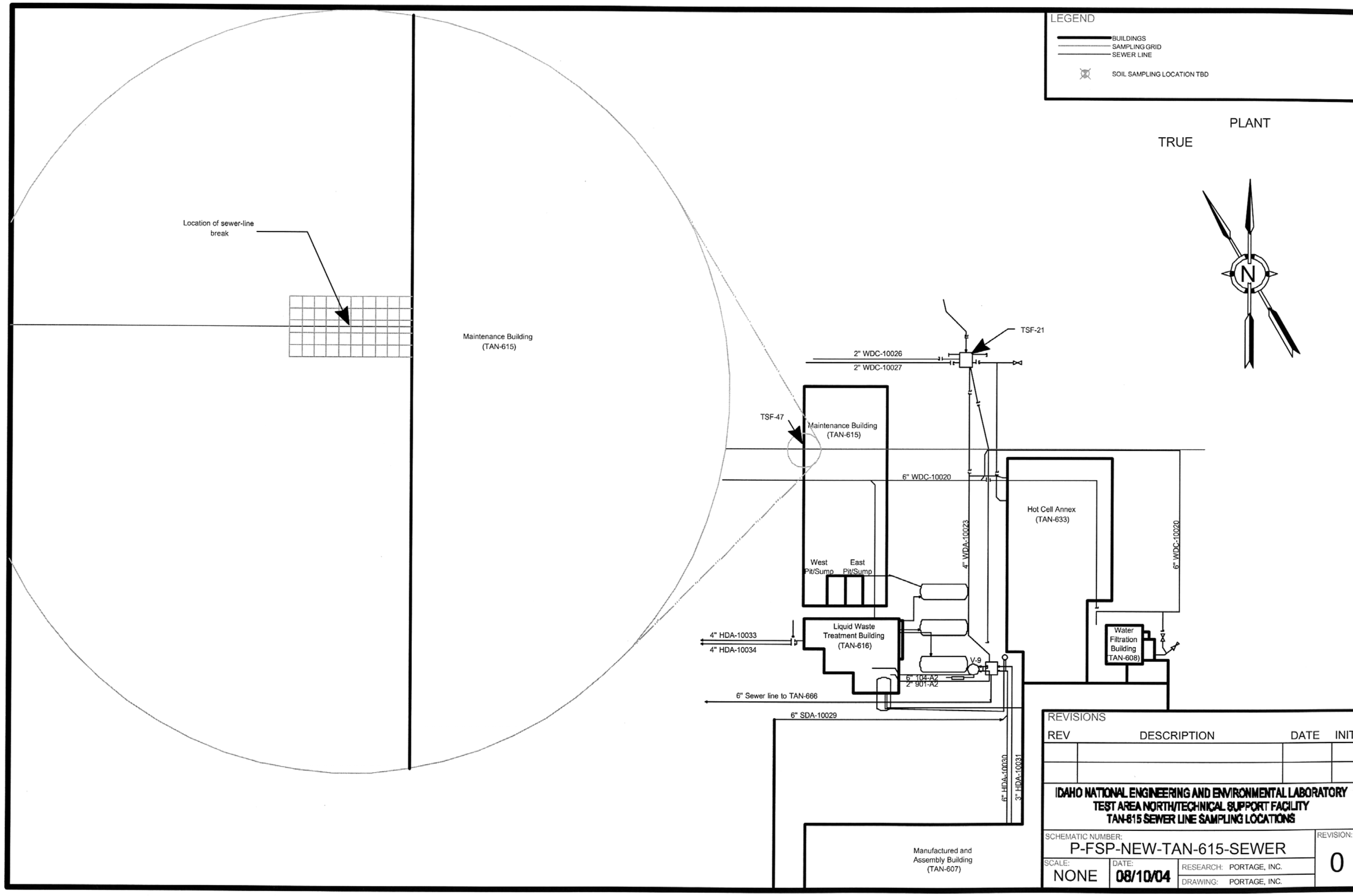

Figure 7. TSF-47 Area of Concern.

5.2.3 TSF-48, TAN-615 Area Sumps

Because of their close proximities, excavation and sampling of the TSF-48 site will be done in conjunction with the TSF-46 site (see Figure 6). The excavation of the TAN-616 north side foundation will be extended to include the area where the TAN-615 pits/sumps were located. The TSF-48 site will be characterized using the same wide-area surveys and sample collection/analyses methodology as described in Section 5.2.1. The soil from excavating TSF-48 will be included in the soil pile from TSF-46 and characterized and disposed as described in Section 5.2.4.

5.2.4 Soil Pile Sampling

Soil removed from the TSF-46 site will either be placed into bags (to facilitate management) or stockpiled at or near the excavation site for subsequent disposal at ICDF. Due to the DD&D of TAN-616 and the removal of the concrete floors and foundation, soil from this area may contain concrete rubble and paint chips intermixed with the soil. Soil removed from the TSF-47 and TSF-48 site will be stockpiled at or near the excavation site for subsequent disposal at ICDF. These soil piles will be managed, characterized, and disposed using the same process as other soil piles. Samples will be collected from each of the soil pile(s) (or collection of bagged soil), composited, and analyzed using conventional methods to characterize the soil for acceptance into the ICDF.

A composite random sampling method will be used for sampling the excavated soil intended for disposal at ICDF. Fifteen samples will be collected from each pile. These samples will be collected from various locations and depths of the pile. Groups of three samples will be composited to obtain five composite random samples from each pile that will be sent to the lab for analysis.

It is possible that one or more of the soil piles may be placed in bags prior to sampling. For the purpose of sampling, the bags of soil will be considered as one population (i.e., the same as a pile of soil is considered a population). In this case, fifteen bags will be randomly selected and one sample will be taken from each selected bag. Groups of three samples will be composited for a total of five composite random samples. The five composite samples will be analyzed for the constituents listed in Table 6.

5.3 Sampling Frequency and Location

The SAP tables in Appendix A describes each of the sites, the sampling locations, the medium being sampled, the number of samples required, and the analyses that will be performed on each sample. Field deviations from the SAP table presented in Appendix A will be in accordance with MCP-233, "Process for Developing, Releasing, and Distributing ER Documents (Supplemental to MCP-135 and MCP-9395)."

5.4 Sample Transport

After the appropriate sample containers have been filled in prelabeled bottles, the samples will be placed in a shipping cooler containing sufficient blue ice to maintain the temperature of the container at approximately 4°C (±3°C). The completed COC form, prepared by the sampling team member during sample collection, will be taped inside the cooler to document relinquishment of sample custody. Custody seals will then be taped to the shipping cooler to ensure the integrity of the COC between the INEEL and the analytical laboratory.

5.5 Sample Preservation

Sample preservation is conducted to ensure that target analytes do not escape from field samples or become chemically attached to sample containers prior to analysis. To prevent volatile and semivolatile constituents from escaping sample media, field samples are cooled with ice or blue ice. The samples must be placed in the shipping container to be cooled. Sampling personnel shall inspect the individual samples to determine if each sample container has sufficient material to perform the requested analysis. The individual samples must be placed in glass or high-density polyethylene containers and preserved prior to transport to the laboratory performing the analyses.

5.6 Blanks and Duplicates

The *Quality Assurance Project Plan for Waste Area Group 1,2,3,4,5,6,7,10, and Deactivation, Decontamination, and Decommissioning* (DOE-ID 2004a), states that trip blanks and field blanks are not appropriate for collection of soil samples. Field blanks are not required for the soil samples because the very low level of cross-contamination detectable using field blanks would not affect a detection concerning the data obtained from measurements on the soil. As only soil samples are to be collected for this characterization effort, no field or trip blanks will be collected.

Field precision will be based upon analysis of co-located field duplicate or split samples. For samples collected for laboratory analyses, a field duplicate will be collected at a minimum frequency of one for every 20 field samples, assigned a separate sample number, and submitted blind to the laboratory.

5.7 Field Decontamination

Field decontamination procedures are designed to prevent cross-contamination between locations and samples. All equipment associated with sampling will be thoroughly decontaminated prior to daily activities and between sample locations, in accordance with MCP-3480. Following decontamination, sampling equipment will be protected to prevent contamination from windblown dust.

5.8 Sample Handling and Analysis

All samples will be collected and shipped in accordance with MCP-3480, “Environmental Instructions for Facilities, Processes, Materials and Equipment,” and applicable sections of the QAPjP (DOE-ID 2004a). Laboratories approved by the Sample and Analysis Management Office (SAM) in accordance with MCP-3480 will perform sample analysis. The SAM-approved laboratories analyze the samples in accordance with the Master Task Subcontract Statements of Work (SOWs): (1) ER-SOW-156, “Idaho National Engineering Laboratory Statement of Work for Inorganic and Miscellaneous Classical Analyses;”(2) ER-SOW-163, “Idaho National Engineering Laboratory Sample Management Office State of Work for Radionuclide Analysis;” and (3) ER-SOW-169, “Statement of Work for Organics Analyses Performed for the Idaho National Engineering Laboratory Sample Management Office;” and the project-specific task order statements of work. Analyses will follow SW-846 methodology (EPA 1986), or equivalent.

To ensure that data of acceptable quality are obtained from the soil sampling conducted under this FSP, standard EPA laboratory methods, or technically appropriate methods for radioanalytical determinations, will be used to obtain project laboratory data. To account for analytical uncertainties associated with historical characterization data of the soils surrounding the V-tanks, the samples will be analyzed for all CLP target analyte lists (Total Metals, VOCs, SVOCs, PCBs).

5.9 Waste Management

Waste generated during sampling and analysis, such as portions of unused sample material, samples returned from the laboratory, analytical residue, sampling equipment, and PPE, will be managed per the applicable hazardous waste determination. All excavated soil that is intended for disposal will be stockpiled in a staging area before disposition at the ICDF.

The *Waste Management Plan for the V-Tank New Site at Test Area North, Waste Area Group 1, Operable Unit 1-10* (ICP 2004b) provides detailed information on how any waste generated during field sampling and remediation activities will be managed and disposed. Wastes generated during sampling and analysis activities will involve the Waste Generator Services (WGS) point of contact, who will complete the hazardous waste determination and waste profiles to establish the disposition routes for all waste generated.

5.10 Sampling Equipment

Sampling equipment and supplies include the items listed below. Additional required equipment may be specified in the logbook.

- Field logbooks
- Spoons, scoops, and scrapers, as appropriate for solid samples
- Nitrile gloves
- Nonphosphate detergent
- Absorbent towels
- Tap water
- Deionized water
- Measuring tape
- Blue ice
- Ice chest(s)
- Adhesive tape (clear, duct, and strapping)
- Aluminum foil and aluminum pans
- Pens and markers
- Waste containers
- Appropriate sample containers per TOSs/SOWs
- Custody seals
- Parafilm

- Hammer
- Hand auger
- Drill rig/power auger
- Utility knife
- Appropriate preservative(s)
- Safety glasses with sideshields, safety shoes, and other PPE, as required
- Chain of Custody forms
- Sample labels
- Stakes.

6. DOCUMENTATION

To ensure that all sampling, analysis, and data-reporting activities are conducted in accordance with project DQOs and all appropriate safety procedures, adequate documentation of each event must be completed. Therefore, all field activities related to sample collection, site safety, and sample custody must be recorded. In addition, all laboratory activities relating to sample custody, sample preparation, sample analysis, and data reporting must also be completely recorded to ensure that laboratory data can be confidently assigned to field sample points.

The laboratory will perform all functions relating to samples collected under this FSP in accordance with an appropriate laboratory Quality Assurance Program (QAP). In addition, project management and other key project staff may contact the laboratory personnel and obtain a copy of the laboratory QAP and/or visit the facility to ensure that laboratory procedures meet the project-specific goals.

6.1 Field Operations Records

The following sections provide a summary of requirements for adequate field documentation. All field documentation, document control, and daily updating of field logbooks and field materials will be the responsibility of the FTL or designee.

6.1.1 Sample Container Labels

Preprinted labels will be affixed to the sample containers before use and will contain the name of the project, sample identification number, location, and requested analysis. Following collection, the date and time of collection and the sample team member's initials will be recorded with a waterproof black marker on the sample label. The samples will be placed in coolers with blue ice, if required, while awaiting preparation and shipment to the appropriate laboratory.

6.1.2 Field Sampling Logbooks

Field logbooks are legal documents that are the written record for all field data gathered, field observations, field equipment calibrations, samples collected for laboratory analysis, and sample custody. Logbooks are also maintained to ensure that field activities are properly documented as they relate to site safety meetings and that site work is conducted in accordance with the health and safety procedures. Field logbooks will be bound and will contain consecutively numbered pages. All entries to field logbooks will be made using permanent ink pens or markers. All mistakes made as entries will be amended by drawing a single line through the entry, initialed, and dated by the person making the correction. At a minimum, the following entries will be made to the field logbook:

- Identification of all sampling team members
- References to field methods used to obtain samples, field data, etc.
- Location and description of each sampling point
- Types, numbers, and volumes of samples (when observable)
- Date of sample collection, time of sample collection, and sample identification
- Date and time of sample shipping or transfer of sample custody

- Observed weather conditions
- All field measurements
- Any deviations from the standard or expected procedure
- Chain of Custody form numbers.

6.1.3 Chain of Custody Record.

The chain of custody procedures will begin immediately after collection of the first sample. At the time of sample collection, the sampling team will ensure that the sample is logged on a chain of custody form. All samples collected will then remain in the custody of a member of the sampling team until custody is transferred to the laboratory sample custodian (SC). Upon receipt at the laboratory, the SC will review sample labels and the chain of custody form to ensure completeness and accuracy. If discrepancies are noted during this review, immediate corrective action will be sought with the sampling team member(s) identified on the chain of custody as delivering the samples. If discrepancies cannot be corrected with the sample team members, the project manager (PM) will be sought to correct sample labeling or chain of custody discrepancies.

Pending successful corrective action, or when no corrective action is required, the laboratory SC will sign and date the chain of custody form signifying acceptance of delivery and custody of the samples. The sampling team will retain a copy of the signed chain of custody and will note the time of sample custody transfer in the field logbook. Sufficient copies of chain of custody forms will be made at the time of sample delivery to ensure that appropriate personnel have copies. The laboratory will maintain possession of the original copy of the chain of custody forms until completion of sample analysis and will maintain one copy of the chain of custody forms for the term of storage of data at the laboratory. Only at the time of disposal of laboratory data, or transfer to the INEEL Sample and Analysis Management Office (SAM), will a copy of the chain of custody form be out of the laboratory's control. The original copy of the chain of custody will be returned to the SAM along with the final data package deliverable.

6.2 Laboratory Records

Laboratory records are required to document all activities involved in sample receipt, processing, analysis, and data reporting. The following sections describe the laboratory records that will be generated for this project.

6.2.1 Sample Data

Sample data are records that contain the times that samples were analyzed to verify that they met holding times prescribed by the analytical methods. Sample data records should include information on the overall number of samples analyzed in a given day, location of sample analysis (i.e., instrument identification number), any deviations from analysis standard operating procedures (SOPs) and/or methods, and time and date of analysis. Corrective action steps taken to rectify situations that did not conform to laboratory SOPs and/or analytical methods (including steps taken to seek additional sample material if required) should also be noted in these records.

6.2.2 Sample Management Records

Sample management records document sample receipt, handling and storage, and scheduling of analyses. The records verify that the Chain of Custody and proper preservation were maintained, reflect any anomalies in the samples (such as receipt of damaged samples), note proper log-in of samples into the laboratory, and address procedures used to prioritize samples received to ensure that holding time requirements were met.

6.2.3 Test Methods

Unless analyses are performed exactly as prescribed in the analytical methods or laboratory SOPs, test methods describe how the analyses were carried out by the laboratory. Items to be documented include sample preparation and analysis, instrument standardization, detection and reporting limits, and test-specific quality control (QC) criteria. Documentation demonstrating laboratory proficiency with each method used could also be included in this category.

6.2.4 QA/QC Reports

The QA/QC reports will include general QC records, such as initial demonstration of capability of individual analysts to conduct specific analyses, instrument calibration, routine monitoring of analytical performance (e.g., control charts), and calibration verification. Project-specific information from the QA/QC checks such as blanks (e.g., field, reagent, and method), spikes (matrix, matrix spike duplicate, and surrogate), calibration check samples (e.g., zero check, span check, and mid-range check), replicates, and splits should be included in these reports to facilitate data quality analysis. Specific requirements for the reporting format and quantity and types of QA/QC monitoring will be specified in the analytical statement of work (SOW) to the laboratory.

7. QUALITY ASSURANCE PROJECT PLAN

This FSP is to be used in conjunction with applicable sections of the *Quality Assurance Project Plan for Waste Area Group 1,2,3,4,5,6,7,10, and Deactivation, Decontamination, and Decommissioning* (DOE-ID 2004a). This document presents the functional activities, organizations, and QA/QC protocols to achieve the sampling objectives that were determined based on the end use of the data. Definitive data is required in accordance with the QAPjP. Applicability of specific sections of the QAPjP is determined by comparing the requirements outlined in that document with the activities being performed under this FSP. Any QAPjP requirements deemed not to apply are noted, and the documentation placed in the project file.

Duplicate samples will be collected as discussed in Section 5.6. Laboratory precision and accuracy will be within limits and goals described in the QAPjP. Field precision and accuracy will also be within the goals listed in the QAPjP and will generally be 20–25% for both. Analytical method data validation Level A, in accordance with "Levels of Analytical Method Data Validation" (GDE-7003), will be applied to all analyses to determine the quality, defensibility, and usability of the data. A Level A data package will be required for all of the analyses types.

To ensure that all data are acceptable, and that data end users receive information in a form that is usable, a series of evaluations and data reduction steps must occur. Each of these steps is summarized below.

7.1 Data Reduction

Data reduction is the process of converting raw data or instrument data into a usable form for evaluation by project personnel. Reduction of environmental data will occur at the laboratory. The data reduction activities performed at the laboratory convert the data into a form that is used for interpretive purposes for environmental risk assessment and verification of closure design.

Laboratory data reduction involves converting the outputs of the analytical instruments into sample and QC results. Laboratory reduction will be performed as defined in the analytical method. Laboratory deliverables include raw and reduced data. This form of laboratory deliverable will ensure complete documentation of all aspects of laboratory analysis, allow for an independent verification of reported results, provide a form of data that is technically and legally defensible, and ensure that data end users can be completely confident in the results.

Further data reduction may be necessary for use at the project level. When this is necessary, project management will determine the final data uses and parameter needs and provide data sets in the form that project personnel require to complete their tasks. Examples of additional data reduction tasks include unit conversions and use of the data to perform sum of the fractions calculations defined in 10 CFR 61.55(a)(7).

Scientists and regulators within the EPA, DOE Headquarters, DOE Idaho Operations Office, and Idaho Department of Environmental Quality may also review the data to ensure compliance with regulatory requirements. Individual regulators will make requests of the PM for any data sets required to evaluate the soil characterization effort. Project management will provide requested information to regulators in the most usable form possible.

7.2 Data Validation

Analytical data validation is the comparison of analytical results versus the requirements established by the analytical method. Validation involves evaluation of all sample-specific information generated from sample collection to receipt of the final data package by the PM. Data validation is used to determine if the analytical data are technically and legally defensible and reliable. The RCRA QC guidelines will be used to validate the data, with the exception of radioanalytical data. Radioanalytical data will be validated exclusively using, "Radioanalytical Data Validation (GDE 205)." Data validation is a portion of the data quality assessment (DQA) process that is used to determine the data meet the project DQOs. Additional steps of the DQA process involve data plotting, testing for outlying data points, and statistical hypothesis testing relative to the null and alternative hypotheses stated in the DQOs.

The final product of the validation process is the validation report. This project will require a Level A validation report. The validation report communicates the quality and usability of the data to the decision-makers. The validation report will contain an itemized discussion of the validation process and results. Copies of the data forms will be attached to the report and annotated for qualification as discussed in the validation report. The additional steps of the DQA process stated above are not documented in the validation report. The DQA process is completed following receipt and evaluation of all data validation reports. The INEEL SAM and the project will maintain data validation reports.

7.3 Reporting

The laboratory may use its standard report forms when assembling the standard plus raw data deliverable documentation defined in ER-SOW-394, "Sample and Analysis Management Statement of Work for Analytical Services." However, each deliverable must conform to the criteria specified in ER-SOW-394.

The standard plus raw data deliverable defined in ER-SOW-394 includes all pertinent raw data, extraction notes, standard preparation, instrument print-outs, and identifiers for all samples and QC solutions prepared. The ER-SOWs, prepared by the INEEL SAM, have become the standard means by which analytical data deliverable requirements are defined by INEEL projects to both the INEEL laboratories and commercial laboratories used by the INEEL.

7.4 Data Quality Assessment

Data generated in accordance with this FSP will be subject to data quality assessment in accordance with *Guidance for Data Quality Assessment: Practical Methods for Data Analysis* (EPA 2000b). The data will be analyzed to determine if the assumptions were met. The standard deviations relative to the action levels and the normality of the data will be assessed to ensure that the appropriate number of samples was collected. If the data are found to be non-normal in distribution, transformations will be examined to determine if normality can be obtained through a transformation. Otherwise, non-parametric methods will be examined. If it is found that it is necessary to perform a non-parametric analysis of the data, it may be necessary to collect additional samples to obtain the desired false-positive decision error. The statistical parameters of interest will be determined based on appropriate statistical methodology.

7.5 Document Control

Document control consists of the clear identification of all project-specific documents in an orderly form, secure storage of all project information, and controlled distribution of all project information. Document control ensures controlled documents of all types related to the project will receive appropriate levels of review, comment, and revision, as necessary. It also ensures that all documents, which will ultimately affect project QA, are correct prior to their use.

The INEEL SAM maintains original copies of field logbooks, chain of custody forms, and original laboratory data packages. Copies of these documents will be maintained by VCO document control. Copies of all analytical data and/or final reports will also be retained in the laboratory files, and at the discretion of the laboratory manager or QA officer, will be stored on computer disk and in hard-copy form for a minimum of five years from point of generation.

8. HEALTH AND SAFETY

This FSP is to be used in conjunction with *Health and Safety Plan for the Field Sampling and Remediation of V-Tank Area New Sites at Test Area North, Waste Area Group 1, Operable Unit 1-10*, (ICP 2004a) Health and safety documentation will follow company requirements per STD-101, "Integrated Work Control Process" and MCP-3562, "Hazard Identification, Analysis, and Control of Operational Activities." All activities shall be in compliance with the applicable OSHA requirements stated in 29 CFR 1910 and 29 CFR 1926 and applicable management control procedures/program requirement documents. All subcontractor drilling and related equipment shall be inspected by ESH&QA personnel prior to entering TAN.

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Appendix A

Example of Sampling and Analysis Plan Table

Appendix A

Example of Sampling and Analysis Plan Table

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

DRAFT

Plan Table Number: TAN_VTANKS,NEW

SAP Number: DOE/NE-ID-11156

Date: 06/09/2004 Plan Table Revision: 0.0 Project: V-TANK AREA NEW SITES FOR TAN, WAG1,OU 1-10 Project Manager: SCHWENDIMAN, G. L. SMO Contact: ELDER, T. E.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										3A	C1	PC	EL	TI	TA	TV	VL												
VNS001	REG	SOIL	COMP	TOOL	6/21/04	TSF46/48	TAN616/615	EXCAVATE AREA#1	NA	1	1	1	1	1	1	1	1												
VNS002	REG	SOIL	COMP	TOOL	6/21/04	TSF46/48	TAN616/615	EXCAVATE AREA#2	NA	1	1	1	1	1	1	1	1												
VNS003	REG	SOIL	COMP	TOOL	6/21/04	TSF46/48	TAN616/615	EXCAVATE AREA#3	NA	1	1	1	1	1	1	1	1												
VNS004	REG	SOIL	COMP	TOOL	6/21/04	TSF46/48	TAN616/615	EXCAVATE AREA#4	NA	1	1	1	1	1	1	1	1												
VNS005	REG	SOIL	COMP	TOOL	6/21/04	TSF46/48	TAN616/615	EXCAVATE AREA#5	NA	1	1	1	1	1	1	1	1												
VNS006	REG	SOLID	COMP	TOOL	6/21/04	TSF46/48	TAN616/615	EXCAVATE AREA#1	NA	1	1	1	1	1	1	1	1												
VNS007	REG	SOLID	COMP	TOOL	6/21/04	TSF46/48	TAN616/615	EXCAVATE AREA#2	NA	1	1	1	1	1	1	1	1												
VNS008	REG	SOLID	COMP	TOOL	6/21/04	TSF46/48	TAN616/615	EXCAVATE AREA#3	NA	1	1	1	1	1	1	1	1												
VNS009	REG	SOLID	COMP	TOOL	6/21/04	TSF46/48	TAN616/615	EXCAVATE AREA#4	NA	1	1	1	1	1	1	1	1												
VNS010	REG	SOLID	COMP	TOOL	6/21/04	TSF46/48	TAN616/615	EXCAVATE AREA#5	NA	1	1	1	1	1	1	1	1												
VNS011	REG	SOIL	GRAB	TOOL	6/21/04	TSF46/48	TAN616/615	BIAS 1	NA	1	1	1	1	1	1	1	1												
VNS012	REG	SOIL	GRAB	TOOL	6/21/04	TSF46/48	TAN616/615	BIAS 2	NA	1	1	1	1	1	1	1	1												
VNS013	REG	SOIL	GRAB	TOOL	6/21/04	TSF46/48	TAN616/615	BIAS 3	NA	1	1	1	1	1	1	1	1												
VNS014	REG	SOIL	GRAB	TOOL	6/21/04	TSF46/48	TAN616/615	BIAS 4	NA	1	1	1	1	1	1	1	1												
VNS015	REG	SOIL	GRAB	TOOL	6/21/04	TSF46/48	TAN616/615	BIAS 5	NA	1	1	1	1	1	1	1	1												

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels.

AT1: Analysis Suite #1
AT2: CLP Metals
AT3: PCBs
AT4: SVOCs (CLP TAL)
AT5: TCLP Metals
AT6: TCLP SVOCs
AT7: TCLP VOCs
AT8: VOCs (CLP TAL)
AT9:
AT10:

AT11:
AT12:
AT13:
AT14:
AT15:
AT16:
AT17:
AT18:
AT19:
AT20:

Comments:

Analysis Suites:

Analysis Suite #1: Cm-Iso, Am-241, Ni-63, Np-237, Gamma Spec, Pu-Iso, Tritium, U-Iso, Sr-90, Radium-226, Iodine-129

Contingencies:

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table Number: TAN_VTANKS,NEW

DRAFT

SAP Number: DOE/NE-ID-11156

Date: 06/09/2004 Plan Table Revision: 0.0 Project: V-TANK AREA NEW SITES FOR TAN, WAG1,OU 1-10 Project Manager: SCHWENDIMAN, G. L. SMO Contact: ELDER, T. E.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										3A	C1	PC	EL	TI	TA	TV	VL												
VNS016	REG	SOIL	GRAB	TOOL	6/21/04	TSF46/48	TAN616/615	BIAS 6	NA	1	1	1	1	1	1	1	1												
VNS017	REG	SOIL	COMP	TOOL	6/21/04	TSF47	TAN615/SEWER LN	EXCAVATE AREA#1	NA	1	1	1	1	1	1	1	1												
VNS018	REG	SOIL	COMP	TOOL	6/21/04	TSF47	TAN615/SEWER LN	EXCAVATE AREA#2	NA	1	1	1	1	1	1	1	1												
VNS019	REG	SOIL	COMP	TOOL	6/21/04	TSF47	TAN615/SEWER LN	EXCAVATE AREA#3	NA	1	1	1	1	1	1	1	1												
VNS020	REG	SOIL	COMP	TOOL	6/21/04	TSF47	TAN615/SEWER LN	EXCAVATE AREA#4	NA	1	1	1	1	1	1	1	1												
VNS021	REG	SOIL	COMP	TOOL	6/21/04	TSF47	TAN615/SEWER LN	EXCAVATE AREA#5	NA	1	1	1	1	1	1	1	1												
VNS022	REG	SOIL	GRAB	TOOL	6/21/04	TSF47	TAN615/SEWER LN	BIAS 1	NA	1	1	1	1	1	1	1	1												
VNS023	REG	SOIL	GRAB	TOOL	6/21/04	TSF47	TAN615/SEWER LN	BIAS 2	NA	1	1	1	1	1	1	1	1												
VNS024	REG	SOIL	GRAB	TOOL	6/21/04	TSF47	TAN615/SEWER LN	BIAS 3	NA	1	1	1	1	1	1	1	1												

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels.

AT1: Analysis Suite #1

AT2: CLP Metals

AT3: PCBs

AT4: SVOCs (CLP TAL)

AT5: TCLP Metals

AT6: TCLP SVOCs

AT7: TCLP VOCs

AT8: VOCs (CLP TAL)

AT9:

AT10:

AT11:

AT12:

AT13:

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

Analysis Suites:

Analysis Suite #1: Cm-Iso, Am-241, Ni-63, Np-237, Gamma Spec, Pu-Iso, Tritium, U-Iso, Sr-90, Radium-226, Iodine-129

Contingencies: